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An International Journal
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Volume XVIII

January June 1914

PUBLISHED BY

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SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME XVIII JANUARY 1914 NUMBER 1

TREATMENT OF DIFFUSE DILATATION OF ŒSOPHAGUS BY OPERATION

DESCRIPTION OF A HITHERTO UNPUBLISHED METHOD REPORT OF A CASE

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THE treatment of diffuse dilatation of the œsophagus has been directed toward the alleviation and removal of the supposed causative factor which is now generally assumed to be a reflex spasm of the lower end of the œsophagus or cardiac opening of the stomach and commonly spoken of as cardiospasm.

This spasm was suggested as the etiological factor first by v. Mikulicz (1) in 1882 and was confirmed by Leichtenstern (2) in 1891 at the autopsy of a patient who had died but two hours previously. That it is not the sole etiological factor seems to be proven by the fact, as suggested by Rosenheim (3) that similar dilatations are only rarely met with as accompaniments of organic strictures and he suggests as an additional element an inherent predisposition such as a weakness of the œsophageal musculature.

In attempts to relieve this condition dilatation of the cardiac opening has been the favorite mode of procedure and in the majority of cases has proved efficient in relieving the symptoms. V. Mikulicz (4) in 1904, accomplished this by opening the stomach through a laparotomy wound and dilating the cardia by means of a clamp the blades of which were protected by rubber tubing which was passed through the cardia from below upward. Iden (5) recently reported a case in which a cure was effected by the same procedure. Later v. Mikulicz (6) passed his fingers through the cardia and dilated with them in place of the clamp as did Erdmann (7) following his example.

Several instruments have been devised by which dilatation may be accomplished without an open operation. Russell (8) in England first reported success in these cases by this mode of treatment. The best known apparatus, however, are those devised and described by Gottstein (9) in Germany and by Plummer (10) in America. The essential feature consists in a soft rubber dilatable bag or balloon covered by silken mesh or material and fastened on to a bougie. This is passed from above downward through the cardia and then by distending the bag with water under regulated pressure the cardia can be subjected to a dilating force of any degree desired.

This procedure takes into account and relieves but one element, namely, the spasm at the cardia. Recently a certain small proportion of failures and recurrences after this treatment have been reported. Since the œsophagus which has become greatly dilated in many cases does not regain its muscular tone and cannot return to its normal size and shape it is not strange that the simple dilatation of the cardia fails to accomplish a permanent cure.

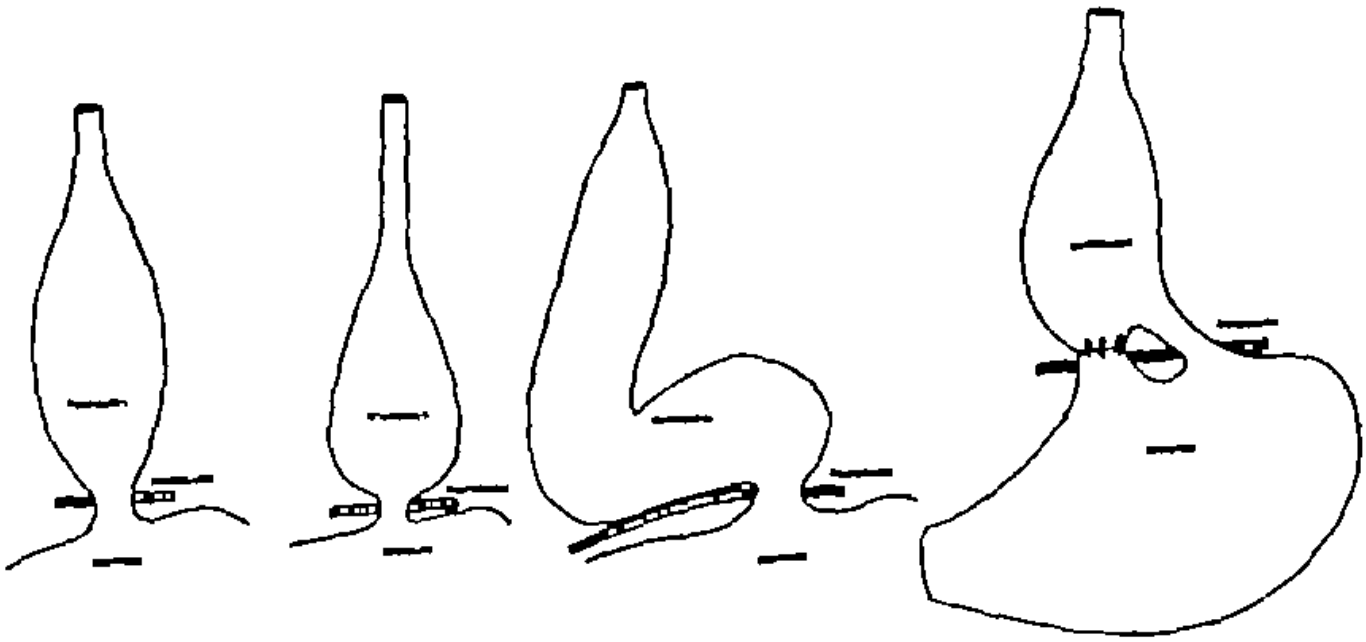


Fig 1. Fig 2. Fig 3 Fig 4

Fig 1. Fusiform dilatation of the œsophagus
Fig Pear shaped dilatation of the œsophagus.
Fig 3 "∞ -shaped dilatation of the œsophagus.

Fig 4 (Œsophago gastrostomy Portion of stomach drawn through an opening in the diaphragm, and the line of union between stomach and dilated œsophagus lies bov the diaphragm, and within the thoracic cavity

In a certain number of cases a very important element in the condition, namely the form and character of the ectasia, must be considered and the treatment must be directed to the relief of an anatomical arrangement which forms a mechanical hindrance to a cure by means of simple dilatation of the cardia

Dilatation of the œsophagus may be fusiform pear-shaped or ∞ -shaped.

In the fusiform variety which is most frequently met with, the cardia is the most dependent portion and there is no increase in the length of the œsophagus. The lumen of the œsophagus is increased from above downward to a point approximately midway between its upper end opposite the cricoid cartilage and its lower end the cardia, and it then gradually diminishes in diameter until it passes through the diaphragm or enters the stomach (Fig)

In the pear-shaped variety the lumen attains its greatest degree of dilatation just prior to its passage through the diaphragm and in this case also the cardia is the lowest and most dependent portion of the œsophagus (Fig 3)

Both of these forms are relieved by simple dilatation of the cardia, although the walls of the œsophagus never return to normal, but remain hypertrophied and the lumen never regains its normal caliber The patients, however continue free from symptoms for many years, as the œsophagus drains readily into the stomach through the dilated cardia and no stagnation of food or fluids results. Recently Plummer (1) states that the œsophagus does regain its shape and size and that its walls can and often do return to normal This is contrary to the experience of most observers and writers

The ∞ -shaped variety is the rarest form and arises in the following manner The upper end of the œsophagus opposite the cricoid cartilage and its lower end at the cardia, being more r less firmly fixed points, the canal bends in those cases in which, as the dilatation of the œsophagus advances, there occurs also an increase in its length. This usually results in a curve toward the right and the dilated œsophagus rests on the diaphragm to the right and posterior to the cardia and from here it passes upward, forward and to the left, and enters the abdomen through the diaphragm at a higher level There is thus developed a reservoir or

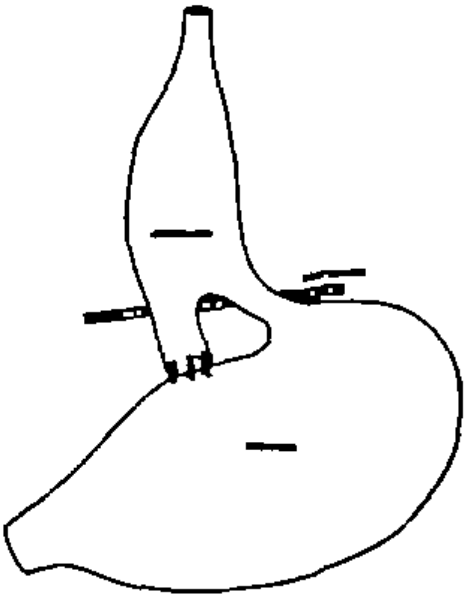


Fig. 5.

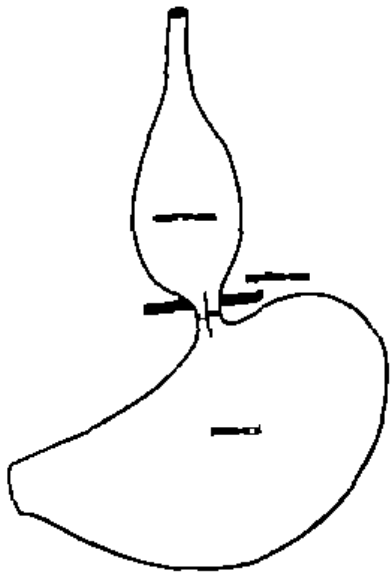


Fig. 6.

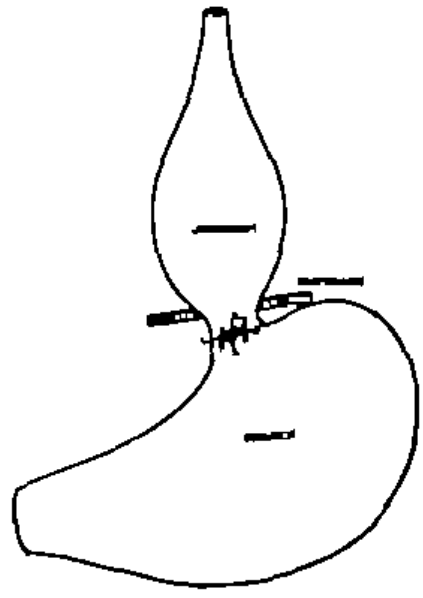


Fig. 7

Fig 5 Œsophago-gastrostomy Portion of dilated œsophagus drawn through an opening in the diaphragm, and line of union between stomach and dilated œsophagus lies below the diaphragm, and within the peritoneal cavity

Fig 6 Cardioplasty showing line of incision A B which divides the constricted or spastically contracted cardia in line parallel to the long axis of the œsophagus.

Fig 7 Cardioplasty showing the vertical incision united so that it lies transversely in line C-D to the long axis of the œsophagus. Note increase in lumen of cardia.

dead space which is placed below the level of the cardia (Fig 3) The stretching of the cardia will fail to remedy the mechanical difficulty which has developed in addition to although as a result of the cardiospasm. In fact, in some cases, the cardiospasm may have long since become inoperative

With the purpose of removing the redundancy Willy Meyer (12) in 1911 devised and successfully performed, œsophagoplication. This is carried out by the transpleural route. The fibers of the vagus are stripped from the œsophagus, and by infolding the wall of the œsophagus the lumen is diminished The procedure, however would not in itself relieve the cardiospasm although Meyer states that in his case the spasm was relieved and suggests that this resulted from the stripping of the fibers of the vagus from the œsophagus.

Œsophago-gastrostomy has been proposed and elaborate descriptions, based on work done on animals and the cadaver have been written by Levy (13) Blondi (14) Janeway and Green (15) and Gosset (16)

This consists in establishing a communication between the dilated œsophagus and the stomach. This procedure was a brilliant conception for although it would not relieve the spasm, still it would render it inoperative by diverting the food above the point of obstruction and, at the same time, it would drain the dead space formed by the lengthened and dilated œsophagus The line of union between the œsophagus and the stomach may be above or below the diaphragm, depending on whether one follows the transpleural or the transperitoneal route In the former case a portion of the stomach is drawn up through an opening in the diaphragm and united to the œsophagus (Fig 4) This procedure may be indicated in certain cases of cicatricial stricture in which the œsophagus is not dilated or in cases of malignant disease in which a portion of the œsophagus must be removed but is scarcely indicated in the ∞ -shaped form of diffuse dilatation because a safer and equally efficient method is open to the surgeon. The same communication between the stomach and dilated œsophagus can be established from within the abdomen by drawing the œsophagus through an opening in the diaphragm (Fig 5) This is a safer procedure because the line of anastomosis lies within the peritoneal cavity and in case of any leakage the infection is taken

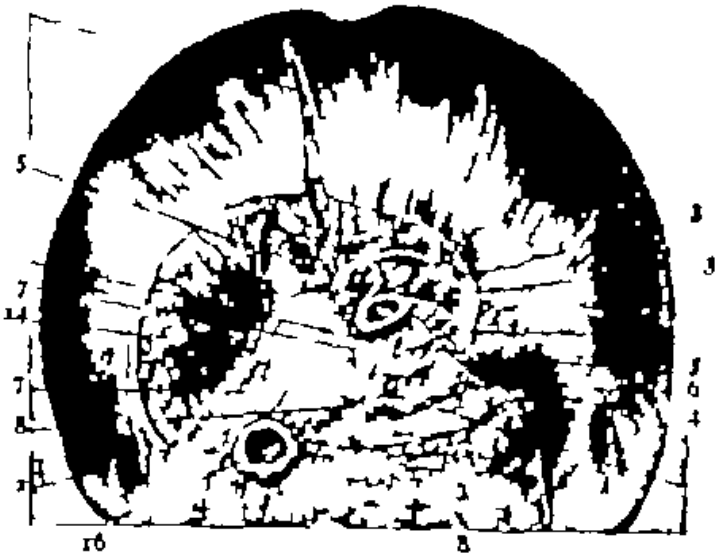


Fig 8 Showing the relation of œsophagus to surrounding structures on under surface of diaphragm and posterior abdominal wall cut edge of left lateral ligament of liver cut edge of right lateral ligament of liver on diaphragm, 3, œsophagus divided 4 splenic vessels divided and emerging from beneath tail of pancreas 5 gastro epiploic vessels and nerves divided 6 gastro splenic omentum 6 peritoneum of lesser sac covering structures on posterior abdominal wall 7 posterior wall of foramen of Winslow 8, pancreas covered by peritoneum of greater sac 9, attachment of pancreas of transverse mesocolon gastric nerves divided phrenic branch of aorta reflection of peritoneum divided, forming falciform ligament of liver 3 non peritoneal surface of diaphragm formerly in contact with left lobe of liver 4, non peritoneal surface of diaphragm, formerly in contact with right lobe of liver 5 inferior vena cava, 16 divided hepatic veins duodenum divided aorta 8 hepatic nerves divided

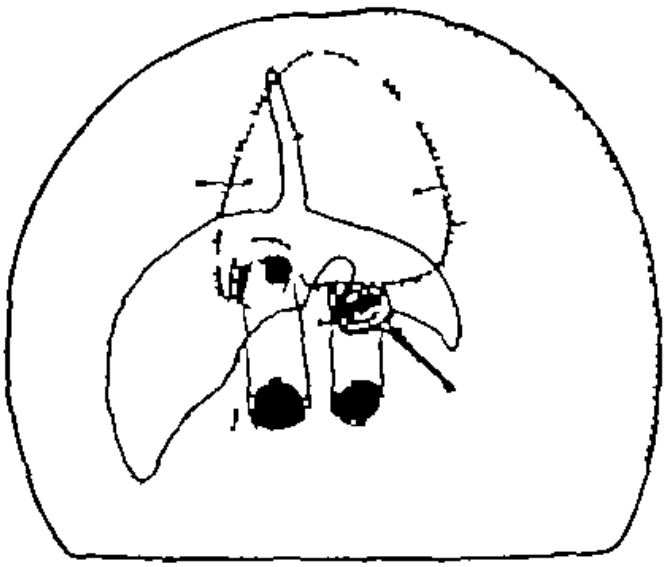


Fig 9 Showing the relations one another of the structures below and above the diaphragm cut edge of left lateral ligament of liver, cut edge of right lateral ligament of liver 3, œsophagus, 2, falciform ligament of liver 5 non peritoneal surface of diaphragm, formerly in relation to left lobe of liver 14, non peritoneal surface of diaphragm, formerly in relation to right lobe of liver 5 vena cava inferior, 7 aorta 9 line of reflection of pericardium, 10, line of reflection of right and left pleurae L F the area in displacement and the direction forward and to the right, here an incision may safely be made, in order to enlarge the opening in diaphragm through which œsophagus enters the abdomen

care of better by the peritoneum than by the pleurae or tissue of mediastinum

Cardioplasty which is analogous to pyloroplasty of Heinecke and Mikulicz, was suggested by Marwedel (17) and has been performed by Wendell (18) The operation consists in dividing the cardia by a vertical incision running parallel to the long axis of the œsophagus (Fig 6) and then in uniting this incision in such a manner that the line of union lies transverse to the long axis of the œsophagus (Fig 7) This procedure would accomplish nothing which could not be more safely brought about by a simple dilatation as the operation would simply relieve the spasm, and would not drain the dependent portion in the σ -shaped variety of dilation The procedure described below will accomplish both of these objects

As the region in which the operative procedure is carried on lies on the posterior abdominal wall, covered by the left lobe of the liver and protected from external violence by the overhanging lower limits of the thoracic cavity formed by the lower ribs and the portion of the diaphragm attached thereto, and in consequence rendered just so much more inaccessible to operative interference, the question of the abdominal incision becomes an important one

The abdominal incision which was employed was first made use of by v Mikulicz (4) and has the advantage of not dividing the various nerves which supply the muscles of the abdominal wall notably the upper portion of the rectus abdominis

The incision commences at the ensiform cartilage and passes down to the umbilicus and then at a right angle to the tip of the tenth rib In addition to this there is a second incision which is below the left breast over the eighth rib and through this the seventh, eighth and ninth ribs are divided, without, however injuring or opening the pleura.



Fig X ray antero-posterior view before operation showing the bead or S-shaped curve of the lower portion of the dilated œsophagus Note that there is no evidence that any of the bismuth meal has entered the stomach



Fig X ray lateral view before operation showing the reservoir or dead space which lies on a lower level than the dome of the diaphragm where the œsophagus enters the abdomen

Although the fracture of the ribs seems like rather a formidable procedure still it is warranted as it adds nothing to the danger of the operation and allows of a much wider and more extended exposure by permitting the bending back of the abdominal flap and thus flattening out the diaphragm

The incision proposed by Marwedel (20) and employed by most European writers running parallel to the free border of the ribs must divide the nerves from the sixth to the ninth and so interfere very materially with the innervation of the abdominal muscles and give rise to a resultant paralysis It would also give a much more restricted exposure

The relation of the œsophagus to surrounding structures is shown in Fig 8 where it is seen that it lies anterior to the aorta and behind the left lobe of the liver where the latter is attached to the diaphragm by the left lateral ligament The peritoneum of the lesser sac is reflected on to the œsophagus posteriorly from the aorta and on the right side from the diaphragm on the left side the peritoneum of the greater sac is reflected in a similar manner from the left crus of the diaphragm where the two leaves of the gastro splenic omentum meet on the œsophagus Anteriorly the œsophagus is not in relation to any peritoneal fold

In operations on the œsophagus from within the peritoneal cavity a very important feature of the anatomy of the œsophagus and the structures below the diaphragm is their relation to the structures lying above the diaphragm These relations are shown in Fig 9 where it is seen that the pericardium lies directly anterior to the œsophagus while the left pleura is in close contact on the left side There is however a considerable space on the right side before one encounters the inferior vena cava. *It is* in this space that one can safely incise the diaphragm. This is indicated in the diagram by the line E-F Any incision to the left of the œsophagus will surely open the left pleural cavity as was inadvertently done in our case

The following case which occurred in the service of Dr J A Blake at the Presbyterian Hospital and through whose kindness I was



Fig. Showing exposure of lower end of oesophagus after left lateral ligament of the liver has been divided and liver drawn downward and to the right cut edge of left lateral ligament of liver on diaphragm; cut edge of left lateral ligament of liver on liver; lower end of oesophagus and cardia, surface of diaphragm not covered by peritoneum, surface of liver not covered by peritoneum re entrant angle between liver and diaphragm



Fig. Showing lower portion of dilated oesophagus ( ) drawn down through opening in diaphragm ( ); cut edge of left lateral ligament of liver on liver re-entrant angle between liver and diaphragm cut fibers of diaphragm to right of oesophagus, dilated lower end of oesophagus

able to operate, illustrates many of the foregoing facts, and presents also a new procedure devised to relieve the spasm of the cardia if present and to drain the dependent portion of the dilated oesophagus

Case History H S single aged Irish cook was admitted to Dr Blak s service the Presbyterian Hospital May 6, with the following history She was admitted to the medical division on April oth and stated that she had had stomach trouble for ten years For the past five years she had had distress after eating and feeling as though the food stuck in its passage to the stomach but this could be partly washed down with water She vomited after every meal and thus relieved her distress The vomitus consisted of food she had just eaten She never had any real pain She gradually restricted her diet to cereals, eggs and milk, which gave her the least distress and trouble About one year ago she noticed in the vomitus food taken twenty four hours previously She never vomited blood She had been in the habit of tasting food at irregular intervals and had eaten at irregular intervals because of her occupation as cook

After test meal the contents expressed showed the following Total amount, cc of thick gray fluid containing small amount of mucus no free HCl marked reaction for lactic acid, and many bacilli resembling Boas-Oppler bacilli Her blood showed hemoglobin per cent red blood cells, ,

She was markedly emaciated her physical examination at that time reported thereon negative A diagnosis of probable carcinoma of the stomach was made and she was transferred to surgical ward and an exploratory coeliotomy performed. The findings were negative, the stomach was normal there were few small fibromyomata in uterus. The appendix was removed She made slow postoperative recovery The wound healed per primum. She was quite unimproved by the operation and was sent back to the medical ward for further observation May st D T C James saw the patient for the first time He passed stomach tube and when about half its length had been swallowed huge reservoir seemed to be tapped and several cubic centimeters of thin watery fluid containing food particles were obtained Water was passed through the tube and gurgling sounds were heard over the anterior chest wall and there developed dull percussion note As much fluid as was possible was poured into the sac and then siphoned back It measured cc Dr James thought that the tube did not enter the stomach but dilated oesophagus, or diverticulum The X ray examination after bismuth meal showed the condition which was present (Figs and) There is diffuse dilatation of the oesophagus which has



Fig 14 Showing clamp *ss ss* including between its blades portion of dilated œsophagus (5) Cardiac opening of stomach and portion of stomach contiguous to cardiac opening (12) 12, cut edge of left lateral ligament of liver on liver re-entrant angle between liver and diaphragm 2, portion of stomach contiguous to cardiac opening 3 line of union between stomach and œsophagus 5 dilated lower end of œsophagus.



Fig 5 X ray lateral view 6 weeks post-operative, showing lumen of œsophagus still larger than normal Note presence of portion of bismuth in the stomach.

also become lengthened and pouch or dead space to the right of the cardia, resting on the diaphragm, can be readily distinguished, an "S"-shaped form of dilatation. There is no evidence of any of the bismuth having entered the stomach

Dr H. H. Janeway examined the interior of the œsophagus by means of his œsophagoscope. The cardia was readily made out and it was dilated by passing several graded bougies through it There was no improvement after the passing of these bougies and the patient was transferred to Dr Blake's service

Operation Dr Lambert. Local anæsthesia, four per cent novocaine A gastrostomy was performed through the upper third of left rectus under local anæsthesia A Kader operation was done, inverting a funnel of gastric wall over a catheter by means of three purse-string sutures

At this time the patient's general condition was poor as she was reduced to a very low ebb and the degree of emaciation was extreme She made an uneventful post operative recovery and gained rapidly and steadily in weight Her feedings by means of the gastrostomy gave her no discomfort, and the leakage from the opening was so slight that there was no irritation or ulceration of skin of abdominal wall in neighborhood of the fistula.

September 5th four months after the gastrostomy she had gained over 50 pounds and weighed 80 pounds On two occasions, September 5th and 16th, the patient was given a string to swallow with the hope that it would enter the stomach and so serve as a guide by which to pass some dilating apparatus. On each occasion, after 24 hours, the patient had a chill, felt nauseated, and had a rise of temperature to 103.5° with a rise of pulse rate to 120. She would then vomit a large quantity of fecal material, together with the string and would then feel perfectly well, while the temperature would drop to normal and remain so

A string was passed from below into the œsophagus by means of a cystoscope, and was seized by Dr H. H. Janeway through the œsophagoscope and drawn up through the mouth By means of this string, using it as a guide, several graduated bougies were passed through the cardia, but with no beneficial results No food passed into the stomach when taken by mouth. The cardia was then dilated by means of the Plummer apparatus The dilator passed without difficulty but there was absolutely no improvement following repeated dilation

Operation Dr Lambert, February 9 3 Patient was given ether and cardioplasty was performed as follows The peritoneal cavity was opened by a median incision which extended from the ensiform cartilage to the umbilicus A second incision then extended to the left from the umbilicus

transversely to the tip of the tenth rib in anterior axillary line The seventh, eighth nd ninth ribs were divided near the attachment of their cartilages through an incision beneath the left mammary gland The pleural cavity was not entered The stomach was then freed from the anterior bdominal wall by dissecting the gastrostomy free. This was then temporarily closed by purse-string suture The abdominal flap was then reflected upward, being hinged on the line of the ribs which had been divided The left lateral ligament of the liver was divided and the li er was dra n downward and t the right while the tomach was pulled downward and t the left Thus gave perfect exposure of the cardiac opening of the stomach (Fig 1) The diaphragm was then incised from the edge of the cardiac opening toward the right and slightly forward The pleura was accidentally opened during this procedure as the incision was carried t the left of the œsophagus This opening as immediat ly closed by a plain catgut suture Through the hole in the diaphragm the lower end of the dilated œsophagus was freed from surrounding structures by blunt dissection with the index finger A bougie passed down the œsophagus through the mouth was arrested l the extreme right portion of the dilata tion The end of the bougie and pouch of œsophagus were then dra down through the opening in the diaphragm int the abdomen and the œsophagus was fixed in this position by interrupted plai catgut sutures, uniting it t the opening in the diaphragm By this procedure there was established straight tract from the pharynx t the opening through the diaphragm and the redundant portion of the dilated œsophagus, which formed the reservoir for food and the dead space as brought nt the bdomen (Fig) The purse string suture closing the gastrostomy opening was dl ided nd long clamp was passed through the gastrostomy opening into the stomach One blade of the clamp was then passed through the cardia int the dilated portion of the œsophagus, lying ithin the abdomen, hile the other blade of the clamp remained thin the stom ach The clamp as then closed sufficiently t hold firmly but not t cut through the structures ncluded between the blades, namely portion of dilated œsophagus nd portion of tomach including the cardiac opening, nd the clamp became an œsophago-gastrotribe, similar in principle to the enterotribe (Fig 4)

A row of Lembert sutures of chromic catgut united the contiguous portions of dilated œsophagus and stomach, few interrupted sutures of chromic catgut united the diaphragm t the œsophagus A catheter of soft rubber as placed in the stomach through the gastrostomy opening alongside of the handles of the clamp The gastrostomy was then re-established by tw purse string sutures, Kader method, and ttached t bdominal all A double rubber tube dram was placed dow t sut of line of union bet een stomach and œsophagus, and brought out of median wound second double rub-



Fig 6 X ra Lateral iew four months post-operati tv showing that lumen of œsophagus has still further con tracted Note presence of barium meal in stomach

ber t be drain as placed between stomach nd spleen and brought out t extreme left of incision Abdominal wall closed, continuous plain catgut X for peritoneum interrupted plain and chromic su tures for muscles nd pomeurotwes silk orm gut Interrupted and continuous silk for the skin The incision beneath the left breast as closed by in terrupted silk orm gut nd cont uous silk Sterile dressing

Time of operation hours and 20 minutes Patient stood the manipulation and the operation fairly ell nd showed only moderat degree of shock She lost only small mount of blood during the entire procedure

Post-operativ course The ounds healed ith moderat degree of reaction There as considerable oozing from the drainage tubes, which as purulent and of foul odor This gradually cleared up The clamps ere llo ed t remain undisturbed for four days hen they ere tightened t their full extent crushing all structures ncluded bet een them They ere removed on the ninth da post operative

There developed on the second day post-operati tv dry pleurisy in the left pleural cavity accompanied by bronchitis ith thick, tenacious sputum She experienced considerable difficulty in raising the expectoration and it caused her great

deal of pal These two conditions cleared up at the end of ten days. She received no nourishment for three days after operation, but small quantities of water through the gastrostomy On the fourth day post-operative she was given liquid nourishment through the gastrostomy The twenty-eighth day post-operative she took liquids by mouth and solid food on the thirty-third day when feeding by the gastrostomy was stopped.

During the first four weeks there was some bleeding from the site of anastomosis as evidenced by a marked reaction for blood in washings of dilated œsophagus. This gradually diminished and finally ceased. She was allowed out of bed on the thirty fourth day She regurgitated small amounts of food for several weeks but this has now ceased and the patient considers herself well, as she eats every thing she desires and has neither any discomfort nor vomiting She has gained enormously in weight.

X-ray taken six weeks after operation show the bismuth meal has passed into the stomach. The lumen of the œsophagus is still larger than normal (Fig. 5) An X-ray taken four months after the operation show that the lumen of the œsophagus has still further contracted, but has not yet returned to normal size (Fig. 16)

CONCLUSIONS

1 There is a small number of cases of dilatation of the œsophagus, as a result of cardiospasm which require operative interference in order to remain permanently cured

2 This group comprises those cases in which the œsophagus has lengthened in addition to having become dilated and in consequence has the form of an "ω"-shaped curve

3 These cases may be successfully treated from within the abdomen without fear of infection to the pleurœ or mediastinum

4 A preliminary gastrostomy through which the patient may gain nourishment, and so improve the nutrition and power of resistance is an advantage

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THE RELATIONSHIP BETWEEN THE URINARY SYSTEM AND DISEASES OF THE FEMALE PELVIC ORGANS

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SYMPTOMS referable to impaired bladder function play an important rôle in the clinical history of many pathologic conditions of the female pelvic organs. Its intimate anatomical relationship with the surrounding genitalia renders the bladder especially vulnerable to adjacent pathology whether this be in the form of neoplasm infection or displacement. It is undoubtedly true that in the majority of such cases, the bladder is the only portion of the urinary tract affected and with the removal of the primary cause the bladder symptoms will likewise be relieved. On the other hand, there is a second and by no means small group of cases in which the pathology of the urinary tract is more extensive, involving the ureter and kidney as well or disease of the urinary system may exist coincidentally with that of the genital tract, the one entirely independent of the other so far as etiology is concerned. The frequency with which an improper conception of the underlying pathology has prompted the correction of some minor gynecological abnormality when the actual lesion lies in the kidney or ureter opens up another possibility of error to the surgeon who limits his horizon to the pelvic organs or attempts to make his diagnosis from the interpretation of symptoms alone.

That the bladder should be a frequent participant in diseases of the genitalia, whatever their nature is self-evident even to the most casual observer. Such interference is produced not only by distortion of the bladder walls through sacculation, pressure or traction which express themselves by symptoms of mechanical blockage to the passage of urine but also by actual and often extensive changes in the muscular and mucous coats. These changes are due either to a superadded infection or impaired circulation, which affect chiefly the base of the bladder and are caused by partial obstruction of the venous or lymphatic current.

In view of the fact that evidence of some abnormality of the bladder is furnished by pronounced and definite complaints, we are prone to limit our explanation of the symptoms to this portion of the urinary tract, without considering the possibility of involvement of the ureters or kidneys. When we consider the anatomy of the ureters, it is only logical to assume that they must become involved in a certain proportion of cases, and that such an assumption is correct will be readily proven if this possibility is borne in mind and appropriate examinations made to determine it.

In their passage through the pelvis to the bladder the ureters occupy a position which renders them liable to injury from disease of the pelvic viscera. That portion lying proximal to the parametrium is less frequently subjected to direct injury but may be compressed by an impacted tumor a dense inflammatory exudate, or glands which are the seat of metastatic carcinoma. The distal portions of the ureters as they pass through the parametrium, along the anterior vaginal wall and obliquely into the bladder are brought into the most intimate contact with abnormalities of the uterus and vagina, and it is here that secondary involvement is most likely to occur.

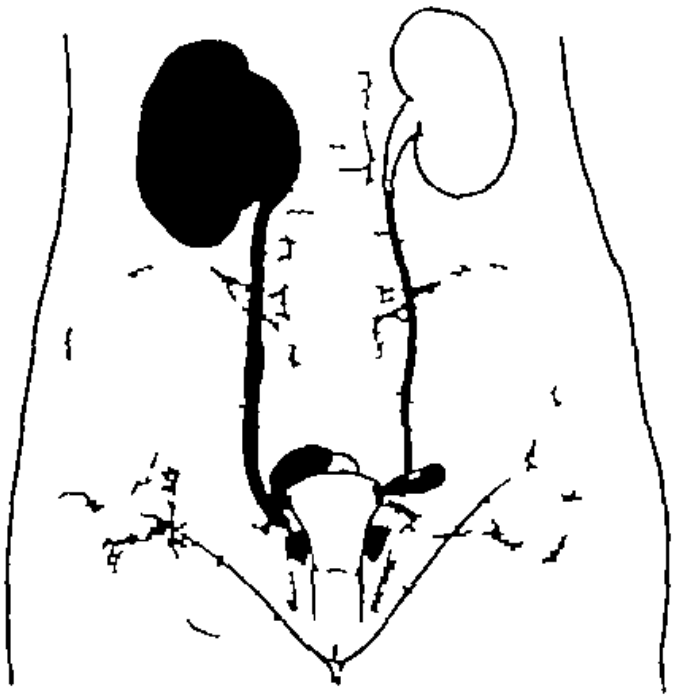
The end results of ureteral involvement fall into two broad groups — the one of purely mechanical origin expressed by dilatation of the ureter and renal pelvis, and the other due to infection. In the light of experimental as well as clinical evidence infection of the ureter and pelvis of the kidney is usually a secondary manifestation the primary factor which paves the way for the development of infection lies in a partial or a complete obstruction of the ureteral lumen resulting in urinary stasis, dilatation of the ureter and pelvis with subsequent infection which may be of hematogenous, lymphatic, or urogenous origin.

The possibility of ureteral compression in massive new growths such as carcinoma of the cervix and intraligamentary or impacted myomata, is commonly recognized that such an occurrence may be associated with other and even more frequent anomalies is not sufficiently appreciated. Under normal conditions the base of the bladder especially the trigone often presents an entirely different picture during the menstrual and intermenstrual periods Incident to the pelvic engorgement occurring immediately before and during menstruation the muscularis and mucosa become acutely congested swollen and edematous. Clinical evidence of this fact is afforded by the frequency of minor vesical symptoms under normal conditions and the exacerbation of symptoms with cystitis during the menstrual flow Given an abnormally small ureteral orifice, this recurrent swelling of the surrounding tissues may be sufficient to produce urinary stasis and subsequent dilatation of the ureter and pelvis of the kidney as has been so ably pointed out by Mirabeau who claims that he has encountered several cases of dysmenorrhoea arising from this cause. Further proof of this possibility is seen in cases of intermittent hydronephrosis in which the increase or onset of symptoms is often associated with menstruation

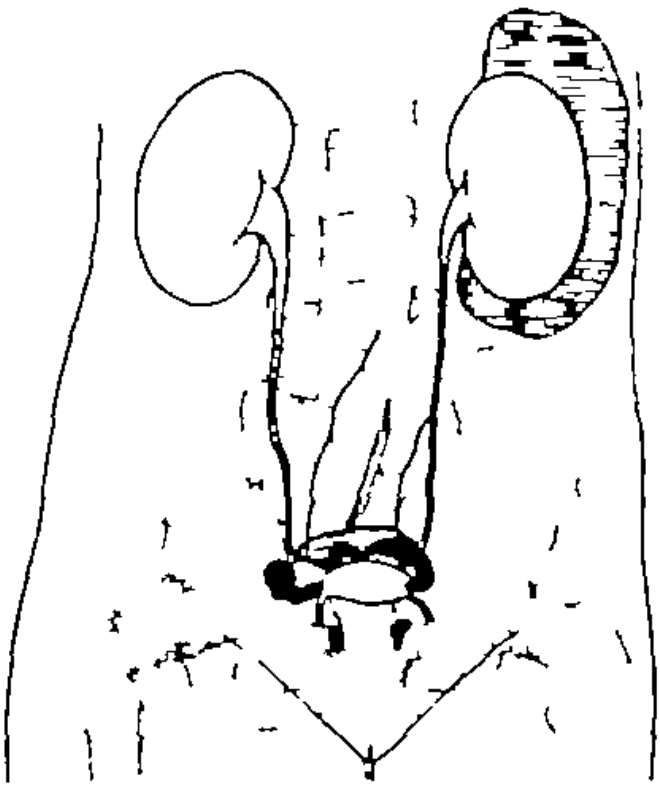
As a digression, but still a pertinent thought in this connection we would suggest that this factor may play a part in explaining the frequency of right-sided pyelitis. In women a freely movable right kidney is a frequent finding and temporary retention of urine in the pelvis incident to partial obstruction of the distal portion of the ureter would by its added weight tend not only to hold the kidney in its lowest position, but also to exaggerate the angulation between the fixed and movable portions of the ureter this in turn adding a second source of obstruction to be overcome. Under such circumstances it seems logical to assume that a greater length of time would be consumed to relieve this retention than would be the case with the left kidney which is situated high and is usually well fixed affording free and immediate drainage with removal of the distal obstruction. Thus as the result of repeated though transient retention a gradual dilatation ensues a more or less permanent urinary stasis results, and upon this infection is engrafted. That dilatation of the pelvis and ureter is commonly associated with pyelo-ureteritis can be readily demonstrated by collargol injection and it has been looked upon as the result of inflammatory changes. According to our theory the dilatation is primarily of purely mechanical origin, and may be secondarily exaggerated not only by swelling of the ureteral mucosa which diminishes its lumen but also by inflammatory changes in the walls of the renal pelvis and ureter which weaken their resistance to internal pressure.

Changes in the bladder which may be seen in benign as well as malignant growths of the uterus, are so commonly recognized as to deserve but passing mention. Suffice it to say that as the result of distortion of the bladder walls direct extension of a malignant growth and impaired circulation due to pressure these alterations may be of a sufficient degree to act as a contributory factor at least in the production of ureteral obstruction. Likewise pelvic infection may exert its influence not only on the bladder but the ureters and kidneys as well that infection of the parametrium has greater potential possibilities of secondary involvement of the upper urinary tract than that located within the peritoneum is self-evident, for in the former the disease is in actual contact with the walls of the ureters. During the stage of active infection pyelitis or pyelonephritis may result from direct extension up the ureter That partial obstruction of the ureter is associated with an ascending infection is well demonstrated in the following case

Case Age 5. Married six years. No children. Menstrual history normal. Leucorrhoea present, but not profuse. The present illness was of about five years' duration, beginning with frequent and painful urination. One year later she had severe pain in the vagina," and her physician discovered an abscess, which was opened and drained. Shortly afterward he informed her that she had fistula in the vagina. There has been no incontinence of urine. Two years ago an abscess of the right Bartholin gland necessitated evacuation. Burning pain along the urethra and frequency



Case Extensive pelvic gonococcal infection, bilateral parametritis with stricture of the right ureter Dilatation of ureter above stricture and pyonephrosis of gonococcal origin.



Case Bilateral pyonephrosis with pelvic abscess secondary perinephritic abscess, cultures from both showed colon bacillus infection

of urination were the chief complaints on admission to the hospital She has had several attacks of pain in the lower abdomen, but none recently This pain was usually bilateral and lasted from t days to one week She occasionally has experienced pain beneath the right costal border and in the lumbar region, which was independent of food or posture Has never had hematuria, but the urine is constantly cloudy

Abdominal examination Tenderness over the lower abdomen Distinct resistance in the upper right quadrant The right kidney was somewhat enlarged, tender and movable

Vaginal examination Induration of the right labium, which presented small opening on its inner surface Uterus in anteflexion Both ovaries and tubes enlarged and adherent. Bilateral thickening of parametrium

Urinalysis Large amount of pus No red blood cells No tubercle bacilli were found either by smear or inoculation of guinea pigs

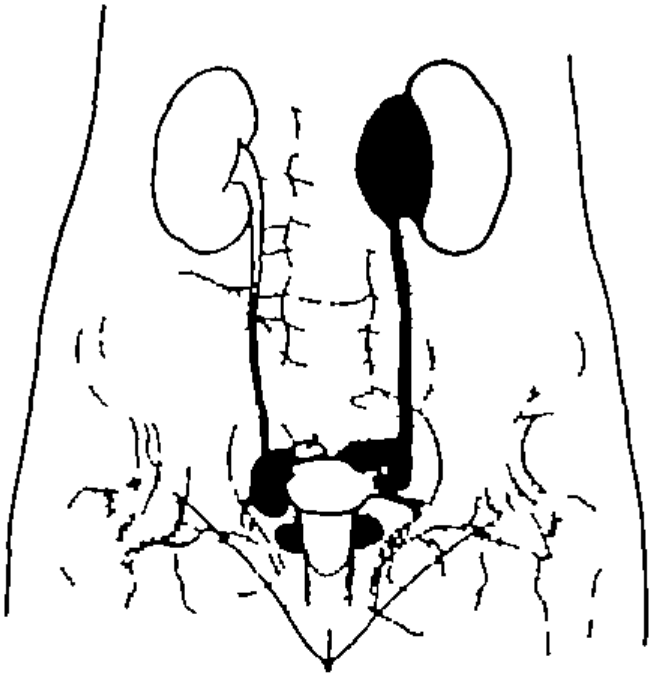
Cystoscopic examination Urethral stricture of large caliber situated about one-half inch in front of internal sphincter On passing probe through the opening in right labium and catheter into the urethra, the two met just behind the stricture Bladder capacity six ounces On the right side of the bladder base just external to the ureteral orifice, was an area of superficial ulceration The orifice was small, thickened and reddened, and from it pus could be seen escaping The left ureteral orifice was normal. Small superficial ulcerations were present in the base of the bladder Indigo-carmine appeared from the left side normally in nine minutes no excretion from the right in thirty minutes Right ureter catheterized for distance of six centimeters, where an impassable obstruction was met Examination of the secretion from the right ureter showed pus, which contained only Gram negative, intracellular diplococci Thirty five cc. of per cent collargol solution were injected into the right ureter without discomfort Skiagraph showed greatly dilated ureter above the stricture as well as dilatation of the renal pelvis.

Diagnosis Stricture of the urethra Urethrovaginal fistula. Chronic parametritis and salpingo-oophoritis Chronic ulcerative cystitis Stricture of right ureter and pyelonephritis of gonorrheal origin

Patient still under observation.

In case the infection travels along the lymphatics, paranephritis may be the sequel

Case 2. Age 20 Single Menstrual history normal. Seven months prior to admission, vaginal puncture was performed for pelvic abscess of tubal origin The present trouble began four weeks ago with acute pain low down in the left side of the abdomen Shortly afterwards a mass was detected beneath the left costal border which has gradually increased in size and is extremely tender especially posteriorly Chills and fever have developed, coming on usually at night. There has been no irritability of the bladder



Case 3 Old pelvic inflammatory disease and parametritis with secondary partial obstruction of the lower portion of the ureter resulting in hydro-ureter and hydronephrosis

Vaginal examination Bilateral tenderness and infiltration of the parametrium

Abdominal examination Indistinctly fluctuating, tender mass in the left lumbar region

Urinalysis Normal

Cystoscopic examination Bladder normal. The left ureter was catheterized and the urine collected showed no pus

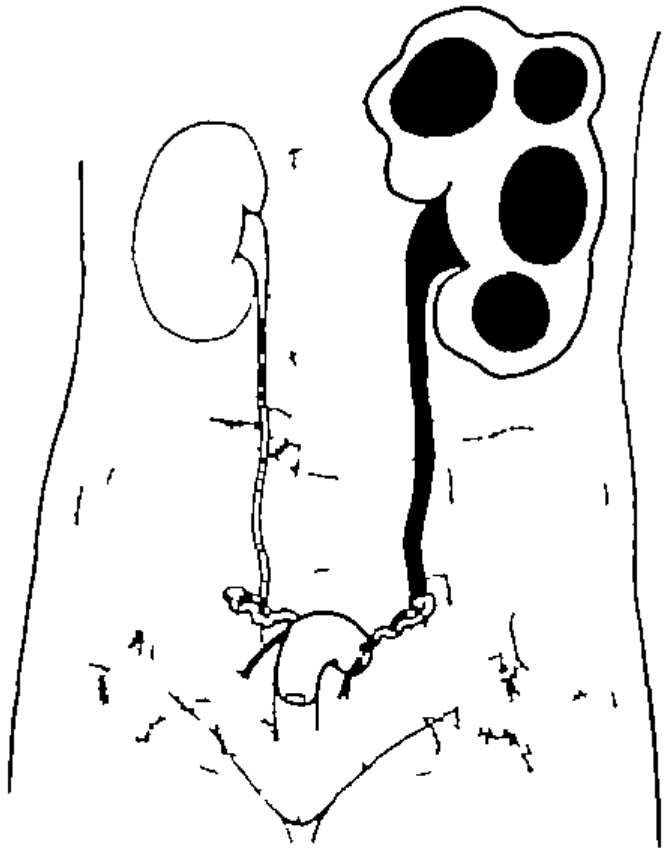
Diagnosis Perinephritic abscess, secondary to pelvic infection

Operation Evacuation and drainage of perinephritic abscess

Drainage removed in five days The patient was discharged from the hospital cured in two weeks

With subsidence of the acute process, the parametrium is transformed into dense fibrous tissue which by its contraction may compress the ureter and lead to the formation of hydronephrosis

Case 3 Age 33 Married Six years ago the uterus and adnexa were removed on account of extensive inflammatory disease The patient was sent to the hospital for the repair of a large incisional hernia and on account of intermittent pain supposedly due to intestinal adhesions Two years after operation left-sided pain developed, which has been of decidedly intermittent character with intervals of comparative comfort The pain developed slowly starting as a dull ache in the left lumbar region and increasing within a few hours to actual colic which required morphine for relief The acute distress persists for ten to twelve hours



Case 4 Acute retroflexion of the uterus associated with acute symptoms due not to retroflexion but to left side tuberculous pyonephrosis.

and then gradually subsides The pain extends downward into the pelvis and left thigh. Eating has no influence either in producing or relieving the pain constipation seems to favor the development of these attacks So far as she can remember there is no increase in the amount of urine voided with subsidence of the attacks There is frequency and urgency of urination, and once blood was noticed.

Vaginal examination Infiltration in both vaginal fornices.

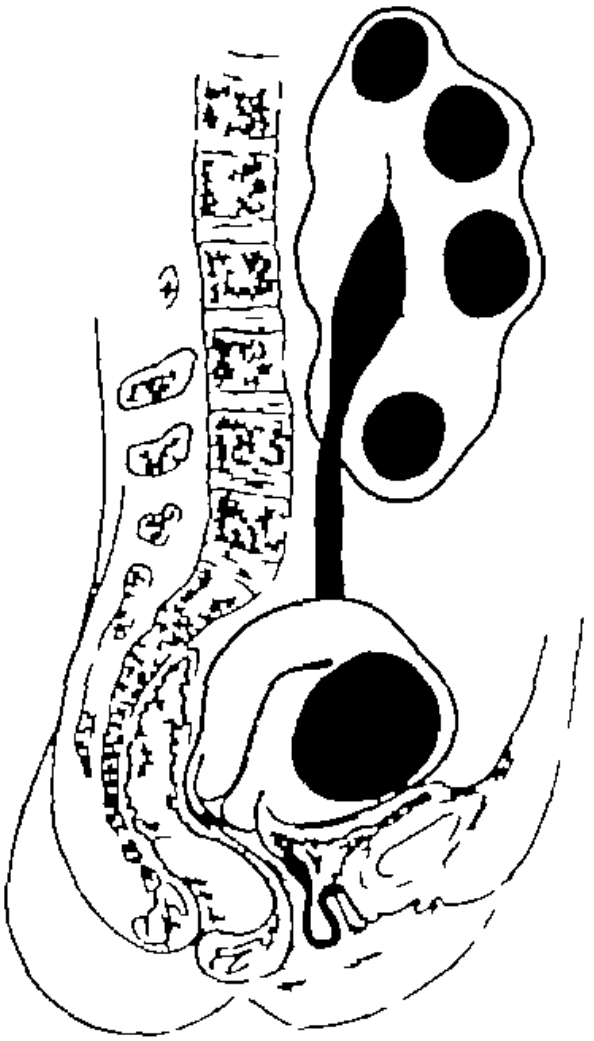
Abdominal examination Large incisional hernia, otherwise negative The left kidney is not palpable nor is there tenderness in the lumbar region.

Urinalysis Normal

Cystoscopic examination Cystitis colli with papillary hypertrophy of the internal sphincter The ureteral orifices present normal appearance the contractions on the right are more frequent than on the left The left ureter was catheterized Urine collected normal Sixty-three cc. of a 10 per cent collargol solution injected when the patient complained of sensation of fullness in left kidney region Skiagraph showed dilatation of the ureter and hydronephrosis

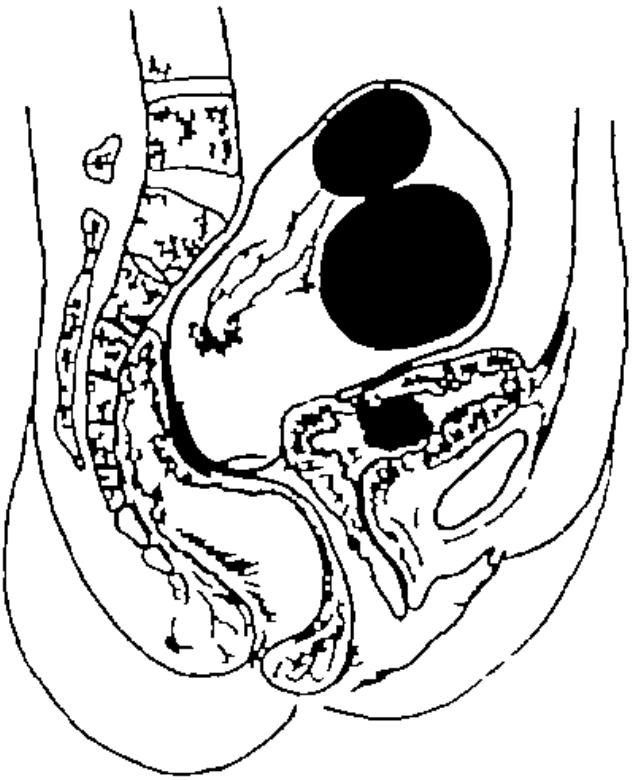
Diagnosis Incisional hernia Left hydronephrosis and hydro-ureter

Operation Left nephrectomy Repair of hernia. Operative recovery uneventful In excellent health two years after operation



Case 5 Vesical instability associated with large myoma uteri and prominent cystocele Cystoscopic examination revealed tuberculosis of the left kidney

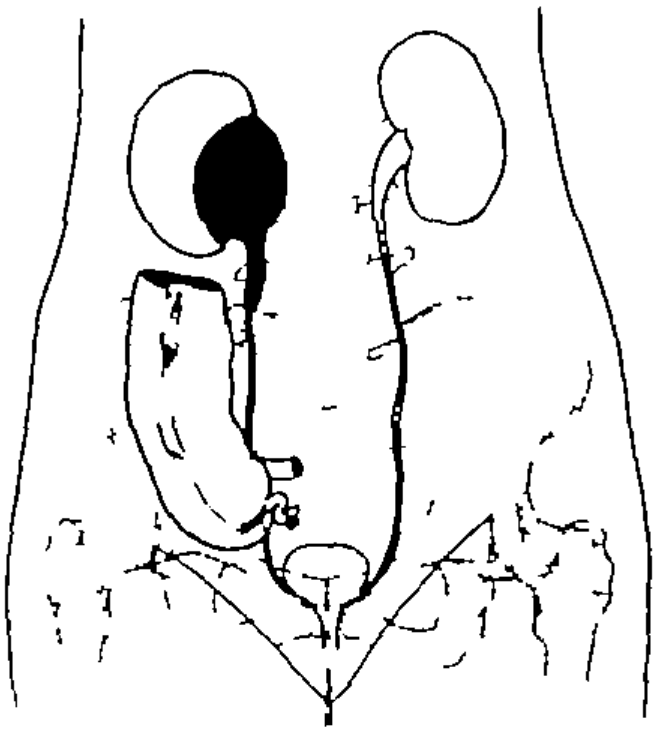
In cases of extensive prolapsus uteri and cystocele, ideal conditions are presented for the development of complications on the part of the ureter and kidney The possibility of such an occurrence was first called to our attention in studying the illustrations which Tandler and Halban present in their monograph on the topography of the ureter where they show a marked dilatation of both ureters accompanying prolapse of the uterus. Under these conditions, there is not only a sacculation of the bladder but an actual descensus of the trigone, a gliding as it were to the lowermost portion of the anterior cervical wall. The ureter must of necessity accompany this descensus and are, therefore subjected to more or less torsion in their abnormal position Pursuing this phase of the subject further we find still other factors



Case 6. Hematuria associated with large myoma uteri Cystoscopic examination showed primary carcinoma of the bladder.

which contribute not only to partial obstruction and dilatation of the ureters but also to their infection Cystoscopic examination of the prolapsed bladder often shows, besides a low trigone, marked thickening of the mucosa and muscular wall and not infrequently extensive oedema bullosum should infection supervene, these changes are exaggerated by those of a true cystitis Under either condition the ureteral orifices are surrounded by a swollen mucosa which offers some impediment to the normal flow of urine. Some degree of residual urine is a common accompaniment of an extensive cystocele and to this stagnation infection may be added, so that the ureteral orifices are literally bathed in a pool of infected urine Given therefore, a partial obstruction of the terminal portions of the ureters, an extension f the infection to the pelvis of the kidney is extremely likely We are confident that an associated pyelitis is responsible in some of those cases of vesical symptoms which persist even after operative correction of the prolapsus or cystocele

In passing, we would say a word with regard to the influence of an uncomplicated



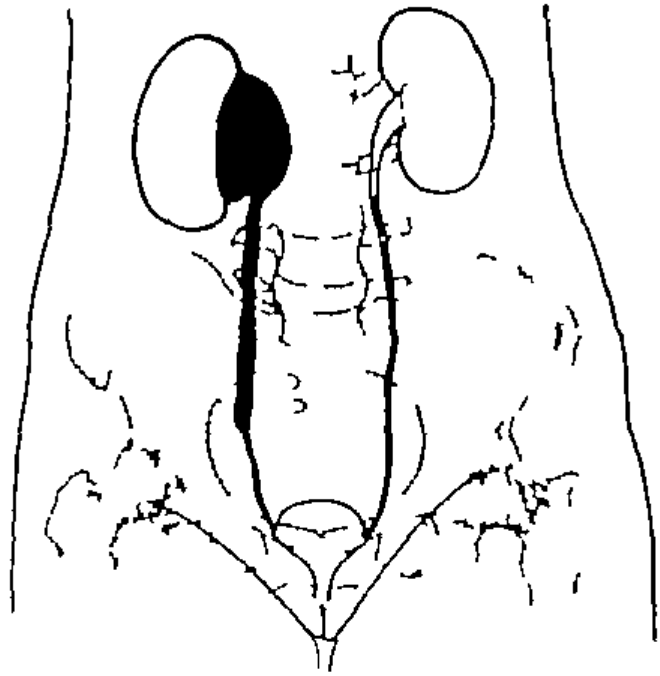
Case 7 Right-sided abdominal pain supposed to be due to either appendicitis or cæcum mobile Further examination disclosed presence of dilated ureter and pelvis

retroflexion in the production of vesical symptoms. A study of these cases has proven to us that the malposition *per se* rarely causes sufficient distortion of the bladder base to make itself manifest by urinary disturbances given such a complication in the presence of a retroflexed uterus it is a safe rule to assume that some other intra or extravesical lesion is present and its exact nature must be determined by appropriate examinations. This is illustrated by the following case

Case 4. Age 50 Menstrual history normal. Six months prior to admission to hospital, the uterus was suspended for the relief of bladder symptoms. The present illness is of one year's duration, beginning with general weakness, loss of appetite and burning urination The bladder symptoms have increased in severity until at present she has a constant desire to void, passing small quantities of cloudy foul-smelling urine. She suffers from pain across the back, especially in the left lumbar region. There has been a rapid loss in weight and strength until now she is practically bed-ridden. For several weeks there has been irregular fever with chills and profuse sweats.

Vaginal examination Uterus, tubes and ovaries, normal. Base of bladder thickened.

Abdominal examination Large, tender and firmly fixed mass beneath the left costal border extending backward, filling the lumbar region.



Case 8 Calculus impacted in the lower portion of the ureter giving symptoms suggesting appendicitis; calculus detected only after injection of collargol, which revealed marked dilatation of the ureter and renal pelvis.

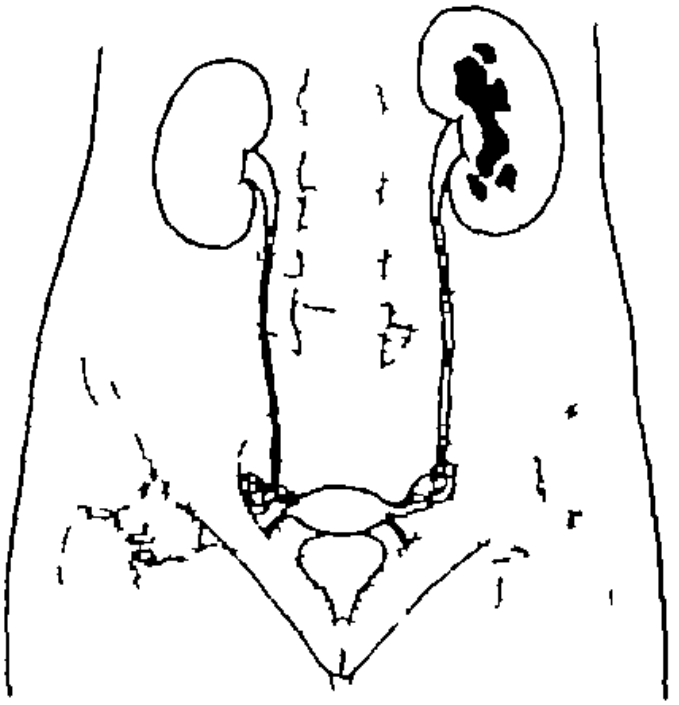
Cystoscopic examination Bladder capacity reduced to less than three ounces. Diffuse ulcerative cystitis. The right ureteral orifice was normal the left, transformed into a large crater with irregular indurated and ulcerated edges. Indigo-carmin appeared from the right side in nine minutes as a dark blue stream. No excretion from the left.

Urinalysis. An abundance of pus and many red blood cells.

Diagnosis Tuberculous pyonephrosis.

Operation: Tuberculous pyonephrosis with superadded colon bacillus infection. Nephrectomy impossible. Drainage. Sinus discharging freely eight months after operation. General health failing rapidly

While it is essential to have in mind these lesions of the urinary tract which are of a purely secondary nature the possibility of a primary disease of the kidney or bladder being a complication of the pelvic pathology is even more important so far as prognosis and treatment are concerned. The findings on pelvic examination may be sufficient to warrant the conclusion that the symptoms are explained solely by some pelvic lesion, while in reality this is of but minor importance. Routine use of the cystoscope in all cases presenting bladder symptoms will soon prove that such complications are by no means rare. Two cases prove the importance of this statement.



CASE 9 On account of left side pain, tubes and ovaries had been removed Without relief, the actual lesion consisted of multiple calculi in the left kidney

CASE 5 Age 49 Mother of five children Previous medical history negative. According to the statement of her physician, a fibroid has been present for over twenty years but until a few years ago had not increased in size and has not been productive of symptoms Recently however there has been an increase in the quantity of blood lost at the time of the periods, which last two or three days longer than formerly Until three years ago, she had experienced no symptoms referable to the bladder aside from occasional incontinence of urine which was controlled by pessary since then, there has been increasing frequency of urination with terminal pain. This is always increased by standing and relieved to some extent by the recumbent posture. Hematuria has never been present There are no symptoms referable to disease of the abdominal organs.

Urinalysis Numerous pus cells Cultures of nine sterile Tubercle bacilli found in urinary sediment as well as by inoculation of guinea pigs. *Skiagraph showed two indistinct, irregular shadows* at the lower pole of the left kidney

Vaginal examination Extensive relaxation of the pelvic floor with large cystocele and rectocele myoma uteri reaching over half-way to umbilicus

Abdominal examination Negative, the left kidney is not palpable nor is there lumbar tenderness

Cystoscopic examination Several superficial ulcerations at base of the bladder The right ureteral orifice is normal the left is transformed into large, rigid, craterlike opening with ulcerated edges Urine from right kidney normal.

Diagnosis Cystocele and rectocele Myoma uteri. Tuberculosis of the left kidney and ureter

Operation Anterior and posterior colporrhaphy Supravaginal hysteromyomectomy Left nephrectomy and partial ureterectomy

Pulmonary embolus ten days after operation which retarded her convalescence. Otherwise there has been steady improvement in her general health with almost complete relief of vesical symptoms

CASE 6. Age 50 Single. For the past five years, the patient has suffered from a rheumatoid arthritis Until three years ago, menstruation was normal since then, the periods have gradually increased in duration as well as quantity and at present they last over two weeks and at times large clots are passed. No bleeding between periods. About one year ago she noticed that the urine was of a dark red color and she was told by her physician that it contained blood Since then, hematuria has been observed on frequent occasions with intervals during which the urine has been normal in color Profuse hemorrhage from the bladder has never been present only rarely are clots passed, at which time she experiences considerable pain Increased frequency of micturition, as a rule without dysuria, has been a recent development

Vaginal examination Myoma reaching almost to umbilicus

Cystoscopic examination Primary carcinoma situated on the left side of the bladder just external to the ureteral orifice

Diagnosis Myoma uteri Primary carcinoma of bladder

Operation Supravaginal hysteromyomectomy partial excision of bladder and implantation of left ureter

A left-sided pyelitis developed on the tenth day after operation with acute symptoms lasting three days, otherwise the patient made good operative recovery Cystoscopic examination three months after operation shows no evidence of recurrence

There remains another class of cases far too common in these days of accurate renal diagnosis, in which the appendix or ovaries are excised in the belief that they are the offending organs, when the only focus of disease lies in the kidney or ureter Every surgeon has met such mistakes in the practice of others as well as his own, and when the final reckoning is taken these errors are to be explained only on the ground of hasty conclusions based upon insufficient data to warrant correct diagnosis Differentiation between lesions of the urinary system and those of the appendix, gall-bladder or ovary may be quite impossible from symptoms and physical findings alone in these doubtful

cases the modern methods of cystoscopic examination will rarely fail to prove or disprove the integrity of the kidney and ureter while neglect of this procedure may result in failure to locate the cause of trouble and consequently in misdirected treatment. While numerous instances could be cited where one or more operations had been performed for some supposedly intra-abdominal lesion when in reality the kidney or ureter was at fault, we will present but three which have come to our notice recently

CASE 7. Age 29. Married. Mother of two children. Menstruation regular, duration three to five days. Severe pain across lower abdomen during the first two days. The present condition dates from the birth of her second child, five years ago. She has suffered almost constantly from severe lateral backache as well as intermittent attacks of right-sided abdominal pain. Four years ago the appendix was removed and for a time she seemed better. During the past year these attacks have reappeared with increasing frequency and severity and she has been troubled with indigestion as expressed by epigastric pain, eructation of gas, and vomiting after eating. She has never vomited blood. No jaundice. As a general thing the bowels are regular with occasional diarrhoea of one or two days' duration. The attacks of severe abdominal pain appear at irregular intervals and usually come on at night. They have no relation whatever to eating or the condition of the bowels. The point of most acute pain is located at the outer border of the right rectus on a level with the umbilicus. At times the colic is so severe that morphine does not give relief and nausea and vomiting are often associated. With the attacks there are no bladder symptoms and the temperature remains normal. During prolonged rest in bed the pain completely disappears, only to reappear when she is up and about. As the result of continuous suffering, she has become very nervous, with considerable loss in weight and strength.

Abdominal examination. Poor musculature and diastasis recti. Caecum palpable and tender. Right kidney palpable. During an attack, exquisite tenderness extended from the right iliac fossa to the costal border and was increased on deep inspiration. No enlargement of the kidney could be detected.

Vaginal examination. Negative.

Urinalysis. Negative.

Skiagraph of the kidneys and ureters negative for calculus. The stomach was somewhat dilated and the colon proved, with a large freely movable caecum.

Cystoscopic examination was not made because the symptoms indicated gastro-intestinal rather than renal origin.

At a second operation thorough examination made of the abdominal organs and no abnormalities could be found. The right kidney was freely movable, but no enlargement could be detected. Flail hip, caecum suspended to lateral abdominal wall. Following the operation and until she resumed her regular activities, she was free from pain. It then returned and has exhibited the same characteristics as before operation. In order to determine the condition of the right kidney a cystoscopic examination was performed.

Bladder normal. Right kidney catheterized — 5 cc. of a 10 per cent collargol solution were injected. The skiagraph shows a marked dilatation of the renal pelvis and upper ureter with displacement of the kidney downward and inward.

Diagnosis. Nephroptosis with angulation of upper ureter and secondary intermittent hydronephrosis.

CASE 8. Single. Age 29. Menstrual history negative. Present illness. Two years ago she was seized with acute pain beneath the right costal margin which soon changed its position to the right iliac fossa. The pain was accompanied by nausea and vomiting and lasted for several hours until relieved by a hypodermic injection of morphine. For ten days following the subsidence of acute pain, tenderness remained in the right side of the abdomen. Four months later she had a similar seizure, and since then the attacks have been frequently repeated and usually come on with the menstrual period. Of late, the pain has been referred down the outer side of the thigh as far as the knee. She states that following the attacks pus and blood have been present in the urine. There has been no bladder irritability either with or between the attacks. Referred to hospital with diagnosis of appendicitis.

Vaginal examination. Negative.

Abdominal examination. Tenderness in the right iliac fossa as well as in the right costo-vertebral angle. No mass is palpable.

Urinalysis. Shows from 5 to 15 leucocytes to the field. No red blood cells and no casts.

Skiagraph. Negative for renal or ureteral calculi.

Cystoscopic examination. The vessels at the base of the bladder are somewhat congested but otherwise the mucosa is normal. The ureteral orifices present no abnormalities either in appearance or in character of their contractions. The right ureter was catheterized and an impassable obstruction was met 3 cm. from the ureteral orifice. At second examination, a smaller catheter was passed, which met an obstruction at the same point as on the previous occasion. Twenty cc. of a 15 per cent collargol solution were injected. A skiagraph showed catheter leading to a shadow in the ureter the size of a pea. Above this the ureter as well as the renal pelvis is markedly dilated.

Diagnosis. Ureteral calculus.

Operation. Transperitoneal ureterolithotomy. Appendectomy.

Uncomplicated convalescence and in good health one year after operation.

Case 9. Age 52. Mother of four children. Aside from present trouble, the patient has always been in good health. For about thirty-two years, she has had a dull aching pain in the left iliac region with only occasional sharp pains of short duration radiating into the vagina. Several years ago the tubes and ovaries were removed on the assumption that they were at fault, but the same pain has persisted. For few weeks prior to admission to the hospital, there have been several mild attacks of pain in the left lumbar region, the pain shows no radiation is unassociated with bladder disturbances and shows no relation to the taking of food, posture, or constipation. N symptoms referable t the abdominal organs.

Vaginal as well as abdominal examination negative slight costovertebral tenderness on the left side.

Urinalysis Many erythrocytes and pus cells.

Cystoscopic examination The right ureteral orifice is normal the left is small, oedematous and reddened. Indigo carmin appeared o the right side as a faint blue discoloration in 5 minutes with no excretion from the left. Phthalein elimination (whole urine) during the first hour 50 per cent, the second, 5 per cent. Both ureters catheterized, the urine flowed freely from the right kidney and was normal. From the left kidney the secretion was greatly diminished and contained many erythrocytes and pus cells. The skiagraph showed multiple calculi in the left kidney

Diagnosis. Multiple calculi in left kidney

Operation Left nephrectomy Only shell of renal parenchyma remained.

Patient made an uneventful recovery It is interesting to note that the phthalein elimination was the same after operation as before.

Realizing that lesions of the urinary system may occur either as complications or sequelæ of disease of the female pelvic organs we cannot urge too strongly the importance of determining their exact nature before resorting to an operation, which otherwise may be inadequate or even unnecessary Experience in a large number of these cases has taught us that the solution of this problem cannot be gained from dependence upon symptoms they can only serve as an indicator which points to the necessity of further investigations. Whether we are dealing with primary disease of the kidney or abnormalities of the pelvic organs which encroach upon the bladder the subjective manifestations common to both are often limited to vesical symptoms. The relationship of the one to the other can be definitely determined only by a thorough examination of the bladder ureter and kidneys. A routine cystoscopic examination in all cases presenting vesical disturbances, irrespective of the coincident pelvic pathology should be the rule, for only by following this precaution can grave errors in diagnosis be avoided.

DIAGNOSIS AND TREATMENT OF BORDER-LINE PATHOLOGICAL LESIONS[1]

By JOSEPH COLT BLOODGOOD M. D Baltimore, Maryland

A BORDER LINE pathological lesion may be defined as one in which it is difficult to differentiate whether it is benign or malignant either from the clinical history and examination or from the gross appearance or from the microscopic section.

In some cases this differential diagnosis is not essential for treatment, because the entire lesion can be radically removed without danger or mutilation.

In many instances, however the differential diagnosis between the benign and malignant leads to an operative removal essentially different and when this diagnosis is made the patient is insured the best chances of a cure if the lesion be malignant and the least mutilation if it be benign.

The development of the diagnosis of border line pathological lesions will keep pace with the number of patients who seek advice in that early period of the disease in which this diagnosis is difficult.

It has only been in recent years that the number of these border line pathological lesions has increased That it has increased during the period of greatest development in clinical gross and microscopic diagnosis, is evidence that patients are seeking advice with lesions in an earlier stage and these lesions, clinically and pathologically are presenting different pictures.

In the past two years I have seen more border line breast lesions than in the previous twenty

In the past few years, also surgeons have been investigating with much greater accuracy and on a larger scale their ultimate results after operations for malignant disease. The following facts have made a great impression on them

In every group of malignant tumors there is a large number often as much as fifty per cent, who come for surgical help after the malignant disease has extended beyond operable removal. Now in these cases, except in a few instances of internal cancer there is no difficulty in making the diagnosis clinically in the gross, or from a microscopic section

These patients are doomed. As yet we have found nothing for their help Granting a few cures with X rays, radium or serum, the number uncured is sufficiently great to be impressive. All of these patients have delayed treatment from ignorance or fear In every case there had been opportunity for operative relief at a much earlier period

In another group as a rule the largest, a diagnosis of malignancy could be made clinically and the diagnosis confirmed from the gross and microscopic study In this group, and on account of this diagnosis, the disease has been operated on with every evidence at the operation that the lesion was completely removed. Nevertheless, the number of cures is relatively small — on the average in about twenty five per cent of the cases.

It is quite true that in some localizations benign lesions may assume all the clinical appearances of the malignant. Yet the number of such cases is so small, and the harm from treating them as malignant upon the clinical diagnosis is so slight, if any, that they need not be considered except in their exclusion as cured cases of malignant disease in the study of the ultimate results

In the next group which in the past has been a small one but fortunately is increasing, the patients come under observation with

Note — This contribution will be followed by series of articles to be published in this journal These articles will discuss the problem of the early recognition and appropriate treatment of the different lesions in certain definite localizations The next article will consider lesions of the lower lip the third, lesions of the tongue and floor of the mouth the fourth, lesions of the mucous membrane of the gum and cheek.

[1] Read before the American Surgical Association, Washington, D C., May 8, 07

lesion in such an early stage that none of the clinical evidence which in the past we have associated with malignant disease is present. From all clinical evidence the lesion is benign. Nevertheless in the past we have met such cases and at the exploratory operation have found malignant disease.

Up until a few years ago the percentage of cases of cancer of the breast seeking advice when the lesion was still clinically benign was about ten. In the past two years the number of cases has reached almost twenty per cent.

As I stated before the number of benign lesions which may come under observation with all the clinical appearances of the malignant is relatively small while the number of malignant lesions which may come for surgical treatment before a clinical diagnosis by the ordinary clinical methods is possible although relatively small is very much larger than the previous group and due to the education of the public and the profession is getting larger daily.

The mental attitude of the surgeon to-day toward mistakes in diagnosis must be changed. In the past for reasons I am unable to ascertain the surgeon seems to have feared most the performance of radical operation upon lesions clinically malignant, but pathologically benign. In this group the only disadvantage is mutilation. The number of cases could never have been large. Perhaps the fear was due to the fact that in the past the number of cures after operation for malignancy in this stage was so small that every surgeon fought against such extensive operations without the justification of certainty in diagnosis. On the other hand when malignant disease has come under his care in an early stage in which a clinical diagnosis could not be made and the surgeon removed the disease as if it were benign and then later found from pathological examination that it was malignant and should have been treated more radically he the surgeon has not felt chagrined nor felt that he has made anything more than a justifiable mistake. In many instances he has attempted to correct this by immediate secondary and more radical operation. The majority of surgeons do not know the danger of this procedure.

My investigation of a large number of cases shows that the radical operation performed upon a malignant lesion clinically benign gives far better ultimate results than an identical operation upon the same lesion at a later period when it is clinically malignant provided the operation in the earlier stage is performed in one stage. In this group the diagnosis of the lesion should be made at an exploratory incision from the gross appearance with or without the aid of a frozen section. The exploratory incision is cauterized and the radical operation follows immediately.

In breast lesions the number of cases is so large that we can work out statistics pretty accurately and these are as follows.

The probability of a cure when the breast cancer is clinically malignant and operable is about twenty-five per cent while if the breast cancer is clinically benign and the radical operation follows immediately the exploratory incision the probability of a cure is eighty per cent. However if the malignant lump only is removed and then later days or weeks after the micro-scopic diagnosis is made the complete operation is performed the probability of a cure is less than ten per cent.

In all malignant lesion in practically every localization the evidence of the ultimate results support these conclusions.

The best opportunity for a cure is after radical operation in that early stage of the

Note: December 1913.—Since this article was written the results in cancer of the breast have been considerably modified. In 1908 the percentage of five year cures of cancer of the breast was [illegible] per cent. This has increased to 41. This improvement is due to the increase in the number of early cases and not to any improvement in surgery.

The difference between the results in operations upon early cases and the large [illegible] still usually brought in which the diagnosis was made at the exploratory incision and followed at once by the complete radical operation is shown in the following figures.

In adenocarcinoma of the breast there are [illegible] early clinically benign cases in which five years or more have elapsed since operation still [illegible] per cent. The results in later clinically malignant cases are [illegible] per cent. In the group there has been one local recurrence.

In the more malignant cancers of the breast, medullary and scirrhous, the percentage of cures in the clinically benign cases [illegible] of the clinically malignant [illegible] per cent. These figures are of course based on a larger number of cases than have [illegible] in 1908. In both groups the percentage of cures has increased but the difference remains about the same.

In further investigations of the ultimate results after operations [illegible] two stages sometimes unchanged. In these cases in which the lump was first removed and then later the complete operation [illegible] were done, there have been no cures. Among the cases in which the breast was first removed and then later other operations done, [illegible] complete operation [illegible] cancer has been performed there has been no cures. In one case the patient refused further operations, but patient has now remained well seven years, and this represents the only permanent cure [illegible] of an undoubted case of cancer of the breast after an incomplete operation.

Later in this paper I speak of two cases. One of these has since died of cancer.

malignant disease in which a clinical diagnosis cannot be made and in which the diagnosis must be made in some other way When however on account of the difficult diagnosis the operation is performed in two stages (first, removal of the lesion, and then after microscopic investigation after an interval of days or weeks, the radical operation) the probability of a cure is less than in those cases in which the patient has delayed until the diagnosis could be made clinically

I have investigated this evidence so carefully that it is my belief that I am making no exaggerated statement in regard to the differences in the probability of a cure after operations upon malignant disease, clinically malignant and clinically benign and the great danger of incomplete operation upon malignant disease when the lesion is clinically benign I feel that all surgeons and the public should know of these dangers.

At the present time the great majority of surgeons are prepared to treat malignant disease in that late stage when the diagnosis can be made clinically Their results undoubtedly will differ to a certain extent in proportion to their abilities in the performance of extensive dissections and to their patience in performing these dissections with the greatest amount of painstaking detail But the actual difference in the percentage of cures will not be very large Due to the great interest in precancerous lesions patients all over the country are seeking advice earlier for palpable and visible lesions of the skin and mucous membranes for lumps in the breast, for pain and swellings about the jaws for pain and swellings about bones and joints In many of these cases the disease is in such an early stage that an accurate diagnosis cannot be made from the clinical evidence and in order to get the best results it must be made at an exploratory incision

Now I am quite certain that none will disagree with me in the statement that the majority of surgeons to-day have not prepared themselves to make this diagnosis at the exploratory incision from the gross appearance with or without the aid of a frozen section as accurately as they have diagnosed malignant disease in the late stage without the help of its gross or microscopic pathology These surgeons have had years of opportunity to examine the gross and microscopic appearance of the various types of malignant disease in the different localizations which they have removed radically on a diagnosis usually correct, based upon the clinical picture These opportunities have been lost, and now that the patients are coming earlier with a different clinical appearance they find themselves unable to employ the older clinical methods and untrained to make the diagnosis from the gross and microscopic pathology at the exploratory incision

In the Surgical Pathological Laboratory of the Johns Hopkins Hospital, where material is received from many outside sources our records show that in all groups of cases the number of cases in which tissue is sent to us for diagnosis, tissue removed not radically has increased tremendously In the past two years we have received more breast tumors than in the previous eighteen in which only the tumor has been removed and in which our microscopic examination showed cancer Now all of these patients had previous to the incomplete operation, a probability of cure of at least eighty per cent Now they have ten per cent or less

Malignant disease in this early stage is not an emergency operation. Surgeons should either prepare themselves to make the diagnosis from the gross or frozen-section appearance at the exploratory incision or turn this work over to some one who is capable The responsibility of treatment in the clinically benign stage is far greater than in the clinically malignant stage Not only is the probability of a cure greater in the early stage but the danger of any mistake is much greater and the diagnosis is more difficult

The methods of diagnosis vary with the localization and the character of the lesion To illustrate the different methods I shall discuss breast tumors, benign and malignant connective tissue tumors, and some types of epithelial tumors of the skin and mucous membrane.

BREAST TUMORS[1]

The problem of diagnosis here is a very important one because when a patient seeks advice a few days after a lump in the breast has been observed there are rarely present any clinical signs of cancer There is no way to make the diagnosis except by exploring the tumor It would, theoretically seem an easy method to excise the palpable mass and subject it to a careful microscopic examination If this demonstrated the lesion to be benign no harm would follow But if it proved to be malignant my investigation seems to show that the patient s chances of a cure are tremendously reduced by such a procedure.

The percentage of cures among the cases operated upon by Dr Halsted and his associates in Johns Hopkins Hospital and other hospitals in Baltimore is about forty after five years. Now if we consider only those cases which were clinically benign and in which the diagnosis had to be made at the exploratory incision we find that when the complete operation followed immediately the exploratory incision the probability of a cure is at least 80 per cent for five years Among 769 cases of cancer of the breast in 99 — about 13 per cent — the tumors were clinically benign In 80 of these cases the tumors only were excised and later — after some days — the complete operation for cancer was performed. Not one of these cases has been cured. It is only fair to state that this operation was performed by Dr Halsted or his associates in only two instances The other eighteen tumors were sent to the surgical pathological laboratory for diagnosis. But I have careful records of the ultimate results. In 15 cases the entire breast was excised later after a microscopic examination in a few the complete operation for cancer was done. So far in this group but two cases were cured — both very early adenocarcinomas. It is possible therefore now and then to observe a cure after removal of the breast only for cancer Here we have 35 cases of cancer of the breast in relatively early stage in which the patients should have had at least eighty chances out of one hundred, in which there have been but two cures — less than six per cent. Contrast with this the 54 cases of cancer of the breast in which the diagnosis was made while the patient was on the table after the exploratory incision and followed immediately by the complete operation for cancer At least 80 per cent of these patients are remaining well five years and more after operation

We might deduce from this that it would be the safer procedure to perform the complete operation for cancer in every lump of the breast, but this is contra indicated by the fact that a large number of relatively young women would be mutilated unnecessarily and at the same time not completely insured against cancer in the remaining breast.

While we have observed 769 cases of malignant tumors of the breast we have records of 542 benign lesions. All of the patients suffering with malignant lesions were 25 years of age, or older at the onset of the disease while of the 542 patients with benign lesions, about 130 were under 25. Therefore if a complete operation for cancer had been performed for every lump in a woman over 25 about 50 per cent would have been unnecessarily mutilated.

Therefore, if we are to educate women that a lump in the breast is an acute disease and should be investigated immediately surgeons must educate themselves to make the diagnosis at the exploratory incision. Although today the number of such cases is relatively small it is bound to increase if this educational propaganda has the desired effect.

At the present time, when a lump in the breast is explored, it is not difficult to make the diagnosis. We can be quite sure from the gross appearance with or without a frozen section that we are dealing either with a benign or with a malignant lesion In Dr Halsted s clinic the mistake of diagnosing a cancer as a benign lesion has occurred but twice. This is a fatal mistake On the other hand the mistake of treating a benign lesion as malignant, while mutilating has no element of danger This has been done much more frequently in this clinic. Among 542

[1] Rhoads Studies Parenchymatous Hypertrophy of the Female Breast and Its Relation to Cystic Formation and Carcinoma Surg Gynec and Obst 1908 December p 721 The Clinical and Pathologic Differential Diagnosis of Diseases of the Female Breast Am J M Sc 1908 February p 177 Cancer Cysts of the Breast and Their Relation to Non Malignant Cysts J Am M Ass October 31 1903 p 1273 Kelly and Noble Inflammations and Tumors of the Female Breast Gynecological and Abdominal Surgery 1908 vol

benign lesions from all sources 54 or 10 per cent, have been incorrectly treated for cancer The rule should be that when in doubt, the breast lesion should be treated as malignant. I am confident that when this is done the fatal mistake of an incomplete operation for cancer will rarely if ever be made But the complete operation for a benign lesion will take place in most experienced surgeons hands in at the most 10 per cent of the benign cases.

It is interesting to note that among these 54 benign lesions which were treated as malignant in 27 cases the diagnosis of malignancy was based upon the clinical appearance alone. That is, associated with the benign lesion there were some changes in the nipple or skin which as a rule are the signs of cancer In 24 cases, the diagnosis of cancer was based on the gross appearance at the exploratory incision in five cases on the frozen section. It would be natural to ask whether in these twenty two cases in which the diagnosis of malignancy was made from the gross appearance, a frozen section would not have aided in the diagnosis I am inclined to think that it would have left the surgeon still in doubt.

From my experience conversation and correspondence with surgeons and pathologists throughout the country I get the impression that the majority do not realize the danger of incomplete operations for cancer of the breast or from two-stage operations such as removal of the tumor or the breast and later after microscopic diagnosis, the complete operation for cancer Surgeons and pathologists not knowing the fatality of such a mistake are less chagrined than when they make the other mistake of diagnosing and treating a benign lesion as cancer With this knowledge all of us should when in doubt treat the breast lesion as malignant and expect as the natural consequence to perform now and then the cancer operation for a benign lesion

The following exact figures of the possible mistakes in the different types of benign lesions are recorded here for the interest of surgeons and pathologists who are called upon to make this diagnosis

I shall not discuss this problem further nor give any illustrations because the entire subject is about to be published in detail as presented in the Muetter Lecture in Philadelphia last December

Connective-tissue tumors Taking for consideration those tumors which arise in the derma (subepidermal) the subcutaneous tissue, the fascia the sheaths of tendons and nerves and the intermuscular connective tissue we have 406 distinctly benign cases and 132 sarcomas. The probability therefore of malignant disease is about 25 per cent. Many of the sarcomas developed in pre-existing lesions which may be looked upon as benign In sarcoma of the skin where on account of its position the pre-existing lesion is easily visible and palpable, the number of such cases is larger For example in 48 sarcomas of the skin the malignant tumors developed in a nævus 8 times, in a scar 10 times in a fibroma 9 times There were therefore, only 11 cases in which the previous presence of a benign lesion could be excluded. In sarcoma of the subcutaneous tissue it is more difficult to demonstrate a pre-existing benign lesion but the long duration in many cases of the palpable mass before any local growth suggestive of malignancy would indicate this probability

If these subepidermal and subcutaneous tumors are attacked surgically very quickly after their first appearance, the problem of differential diagnosis between the benign and malignant, although it may be difficult is, in the great majority of cases, not at all essential for treatment, because these lesions in their beginning can be radically removed by complete local extirpation without danger or mutilation and it makes little difference what the microscopic section shows except as to the prognosis. The locally and completely removed sarcoma when it is not cured kills by metastasis through the blood vessels and no local operation no matter how extensive, will influence this result.

In a few instances, on account of the position and extent of the local growth, the differential diagnosis between a benign and malignant lesion may be necessary to save the patient from a more extensive local operation which would be indicated for sarcoma and unnecessary for a benign lesion In our experience this rarely happens. In 406 dis-

tinctly benign lesions the operation was performed on the diagnosis of sarcoma in 82 cases but in only 5 cases did this more extensive eradication unnecessarily mutilate In these five cases an amputation was done On the other hand a correct surgical diagnosis from the clinical history and gross appearance saved patients from the mutilation of amputation 8 times. Correct diagnosis, therefore in 406 cases would have saved mutilation in 13 instances

The microscopic differentiation between certain types of benign connective tissue lesions and sarcoma is so difficult, especially in those types of sarcoma in which the probability of a cure after complete local eradication is so large that in my opinion based upon this investigation of 538 cases, I should always incline to the diagnosis of malignancy when in doubt. In the vast majority of cases such a more extensive operation will not increase the risk or the mutilation

On the other hand, it is much simpler except for the angioma, to completely excise all benign connective-tissue tumors, and in my experience enucleation should never be done. With few exceptions these benign connective-tissue tumors can be radically excised by cutting through healthy tissue beyond the new growth just as one should do in sarcoma and thus treat the case as a sarcoma. After such an operation the most expert cellular diagnosis will cause the surgeon no anxiety

There are however a few cases in which a differential diagnosis is essential to save mutilation but fortunately in these few cases the infiltrating character of the local growth is such that if it is sarcoma little could be expected as to a permanent cure from removal, no matter how complete while for the benign lesion such a mutilating operation would be unnecessary

This is true in certain types of intermuscular hæmangioma and in fibrohæmangioma in myositis where the absence of bone formation makes the identification of the benign lesion more difficult. It is also true in some extensive fibrospindle cell tissue formations in scars and in the desmoid tumors of the abdominal wall In all the cases in which I had an opportunity for investigation the sarcomas which might simulate these benign lesions were hopeless while the benign lesions when recognized have been cured by less mutilating operations.

In differentiating this more difficult group surgeons are aided by an accumulated experience of the results of operations for the different lesions in the different localizations.

In tumors of the tendon sheaths, of the abdominal wall especially of the recti, in scars, and in fibromas, we see cellular pictures resembling very closely periosteal sarcoma of bone In the former lesions we rarely fail to cure in the latter the reverse.

I am unable to find in the literature a comprehensive investigation of connective-tissue tumors benign and malignant.

That I have called these 406 cases benign is, of course no absolute proof of their benignity because in the majority of cases the local operation was sufficiently radical to have cured some types of sarcoma. The ultimate results, however in these 406 cases show no deaths from malignancy even in a smaller group in which the lesion was not radically or even completely removed. There have been recurrences in a few especially the angiomas and in scar tissue tumors, but in these cases secondary operations have accomplished cures.

On the other hand the ultimate results in 132 cases of sarcoma confirm the diagnosis in the majority but among those cases which have remained well one might question the diagnosis of sarcoma.

In sarcoma of the skin there are 14 cases of round-cell angiosarcoma of the perithelial type and but one cure while among 10 sarcomas in scar tissue we are certain of 3 cures and 7 deaths from sarcoma. In how many of the 8 cases was the lesion really a sarcoma The same question might be asked in 9 cases of sarcoma of the skin which developed in fibromas. We know that six are cured, three were not Among the two cases of multiple sarcoma of the skin and three of mycosis fungoides there is not a single cure The cures, therefore in sarcoma of the skin, with one exception are in a type of sarcoma most difficult to differentiate from fibroma or keloid What the results would have been



Fig Path No 3360 Hemangioma, skin of finger Age 5 tumor 3 months Ulceration following trauma 3 weeks Excision with Paquelin cautery 1 base \ recurrence See Fig for photomicrograph



Fig 3 Path \ 2450 Hemangioma, subepidermal and subcutaneous White male aged 24 skin nev and subcutaneous compressible nodules for years rapid growth following trauma 3 weeks Tumor infiltrating Sent to St Agnes clinic with diagnosis of sarcoma for amputation Compressibility and change in size exclude sarcoma Complete excision Microscopic section shows hemangioma and lymphangioma \ recurrence good function of arm

these 48 cases of sarcoma of the skin had the patients sought advice early Is difficult to state In only six cases the lesion had been present less than one year Three of these cases have been cured. The type of the sarcoma in three cases that have not been cured was the most malignant — perithelial angiosarcoma In the remaining cases the lesion had been present one or more years, and we naturally ask the question Would not the number of cures have been increased by earlier intervention especially among the sarcomas in scars, fibromas and nevi? In all of these cases at the onset radical operations could have been done without mutilation The hope to cure a sarcoma of the skin of the more malignant type not developed in pre-existing lesions must depend upon the education of the public physician and surgeon to the necessity of immediate local and complete extirpation For example, in four cases of perithelial angiosarcoma the little lesion was

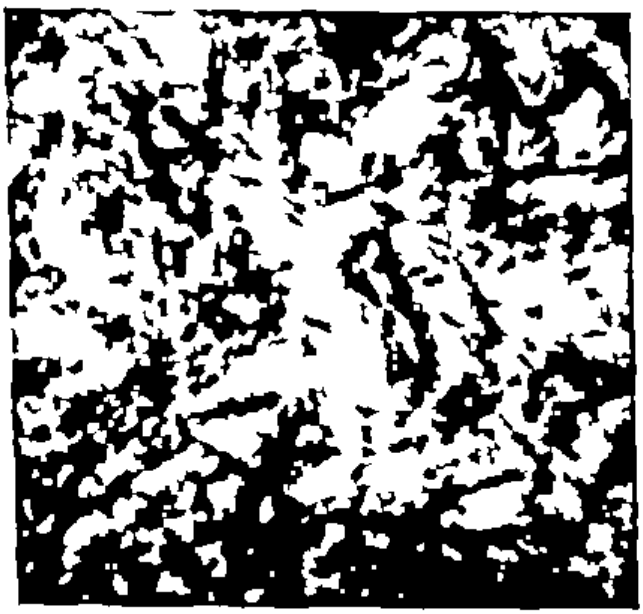


Fig Path No. 3360 Photomicrograph of Fig Ulcerated subepidermal hemangioma of finger This section could exclude sarcoma The patient was sent into the clinic with diagnosis of sarcoma for amputation of the finger.



Fig 4 Path No 753 Hemangioma, back of hand Tissue sent from dispensary with diagnosis of sarcoma The tumor had ulcerated after trauma, similar to Fig 2. The section shows hemangioma very cellular due to perithelial and endothelial proliferation. Piece of epidermis shown in section



Fig 5 Path No 3 86 Congenital hemangioma of face Male aged 58 at birth tumor size of ten-cent piece below eye gradual growth fifteen years ago unsuccessful treatment with Paquelin Photograph shows condition before treatment at age 58

present in the scalp and could not be differentiated clinically from an ordinary wen These tumors were operated on from six weeks to two years after onset None were cured Most surgeons look upon the appearance of the scalp tumor clinically like a wen as an



Fig 6 Path No 630 Fibrohemangioma about ankle joint Male aged 46, tumor 24 years, first compressible with variation in size, now hard and nodular Sketch of condition about ankle See Figs 7 8, and 9 for gross and microscopic pictures Clinical diagnosis sarcoma, partial excision, because amputation refused Patient well over sixteen years after operation



Fig 7 Path No 630 Sketch of the tumor mass exposed at operation by Harvey Cushing See Fig 6

innocent lesion but our experience shows that there is a possibility of the most malignant type of sarcoma Therefore all such tumors should be completely excised at once The most radical extirpation here is not mutilating The danger of the delay is not in a local recurrence, but in metastasis

Hemangioma We have for study 132 cases of benign hemangiomas, which have been subdivided as follows Hemangioma of the skin or subcutaneous tissue, 95 cases in correct diagnosis 9 cases. But in these cases the complete local excision on the diagnosis of sarcoma did no harm. In four cases in which the ulcerating tumor was situated in the neck of young children the correct diagnosis saved



Fig 8 Path No 1630 Photograph of alcohol specimen in case illustrated in Fig 6 Note the white areas and the dark brown spongy areas From the spongy areas blood could be expressed in the fresh specimen



Fig 9 Path No 630 Photomicrograph of case shown in Fig 6 Fibrolipomangioma High power of fibrous area Not cavity lined by endothelial cells

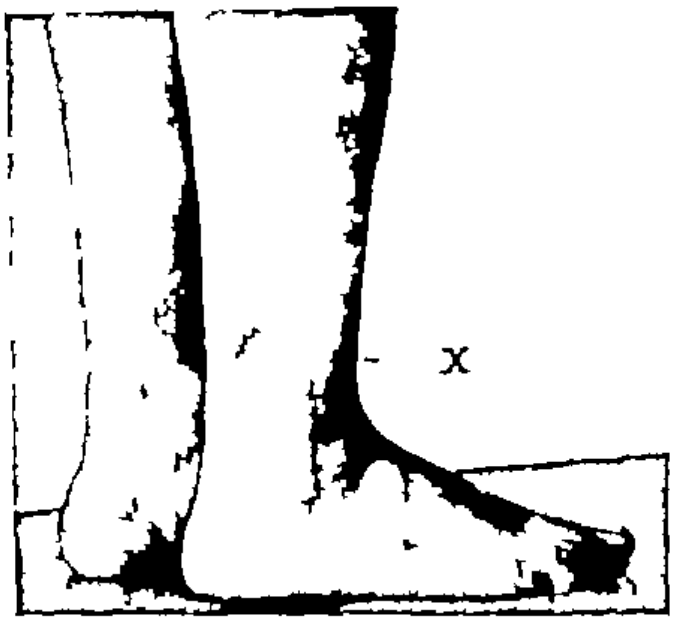


Fig Path N 3 7 I termuscular hemangioma Photograph t illustrat compressible swelling of leg at X Male aged 30 pain in leg eight years compressible lumps seven years, becoming larger when patient is standing At operation, masses of aneous veins, subcutaneous and nternuscular red, spongy vascular tissue Partial excision, Paquelin No recurrence one year ence operation Good function

these patients from more dangerous and mutilating operations.

The hæmangiomas are most frequently congenital tumors They are usually situated subepidermally In this situation they can be recognized by their color as well as by their compressibility In the subcutaneous tumor we have only the compressibility and changes in the size of the tumor to indicate the diagnosis The ulceration of the congenital or acquired subepidermal hæmangioma is not a sign of malignancy The epithelial covering of the angiomatous tissue is so thin that it is easily destroyed by a trauma, irritation or even local growth of the tumor (Figs. 1 and 2) Ulceration of the subcutaneous tumor in my experience has always been a sign of malignancy unless there has been a severe trauma or an exploratory operation

Acquired angioma may be both subepidermal and subcutaneous (Fig 3) These tumors are often extensive and follow the course of the superficial veins In the case illustrated in Fig 3 one could be quite certain that if it were sarcoma the chances of a cure even by amputation would be nil. A sarcoma of this size and infiltrating character would have given metastasis This case was treated on the diagnosis of an angioma, and the ultimate result confirmed the diagnosis.

The microscopic diagnosis of the benign angioma is readily made when we find numer



Fig Path N 3 7 Photomicrograph of intermuscular hemangioma in case illustrated in Fig Note the marked endothelial proliferation in some of the blood spaces

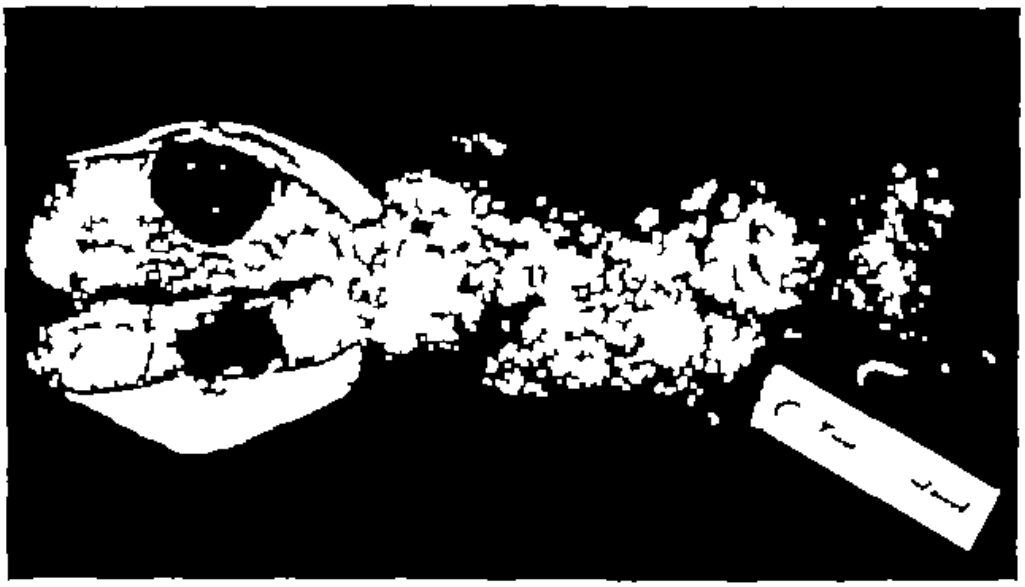


Fig Path \ 9063 Sarcoma (?) in congenital nevus What female aged 67 small nevus on inner aspect of thigh, growth slow for three years rapid past 8 months Exploratory incision three weeks The photograph illustrates tumor and subcutaneous tissue removed from thigh and groin \ metastasis to glands Well 6½ years after operation See Fig 3 for microscopic picture

ous blood spaces lined by endothelial cells (Fig 4) In sarcoma these blood spaces may be present, but they are very few in numbers In some hæmangioma the blood spaces are so small and are so often filled with proliferating endothelium that a diagnosis of a malignant endothelioma might be made In other cases about the small endothelium lined blood spaces the stroma of the angioma is filled with round cells and a differential diagnosis from a perithelial angiosarcoma might become difficult This is especially true when ulceration has taken place In my own individual experience there has never been any particular difficulty in diagnosis when this differential diagnosis was really necessary because in all doubtful cases the complete eradication has so far been possible and in a few when this would have been dangerous or mutilating we have been able to make the diagnosis from a combination of the clinical gross and microscopic features In my experience in benign angiomas there always remain some spongy tissue from which blood can be expressed I have not seen this in sarcoma This gross appearance has been more helpful than the microscopic picture

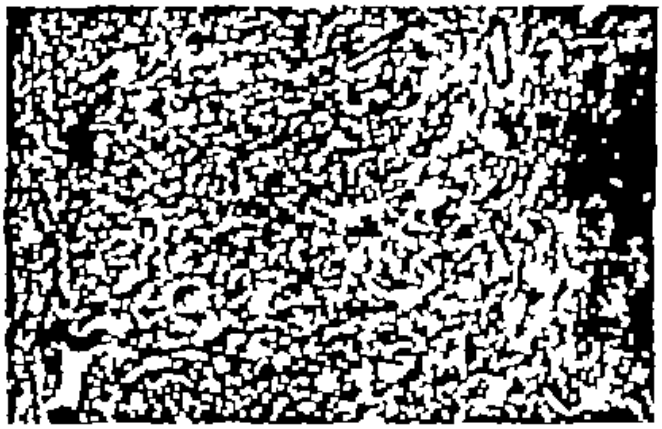


Fig 3 Path No 9063 Sarcoma ( ) in congenital nevus (see Fig) Low power Very cellular tumor but endothelial spaces of capillary angioma preserved

The danger of a sarcoma developing in a hæmangioma is relatively small, but the possibility must always be considered We have at least 36 cases of sarcoma in which the type *suggests its development from an angioma* In some the angiomatous tissue may have been the result of granulation tissue after trauma, and not developed from a pre existing angioma In 12 sarcomas of the skin of the perithelial angiomatous type there is no doubt that in 6 cases the sarcoma developed in a congenital nevus

Neglect to immediately remove or eradicate with carbon dioxide snow has another danger besides the possibility of a malignant change

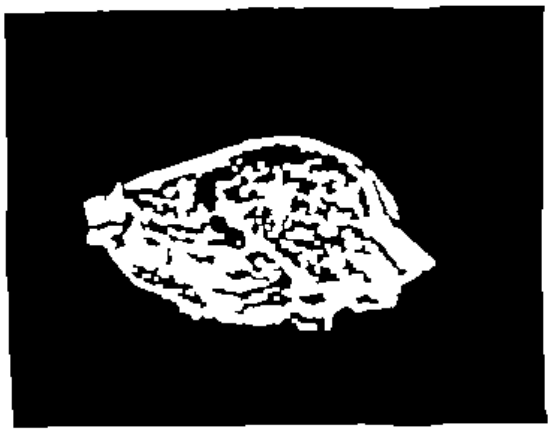


Fig 14 Path No 3280 Sarcoma (?) of skin in fibromatosis Photograph of section through recurrent tumor The dark areas are due to blood pigment White female age 79 blood blister on heel three years tumor two years removed two years ago recurrence six months ago complete excision of tumor and scar (See Figs 5 and 6)

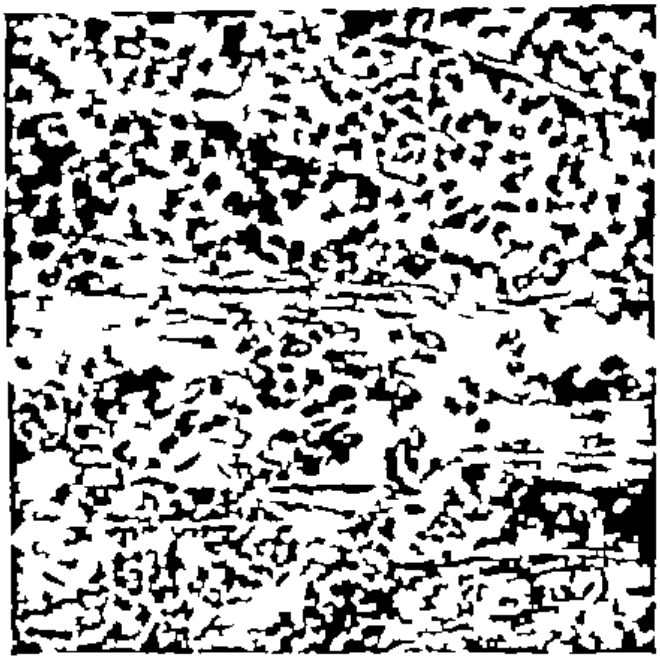


Fig 6 Path No 3280 High power photomicrograph shown in Fig 5 Nests of endothelial cells with and without pigment in fibrous stroma

and that is a huge local growth which itself is mutilating and operation for a cure in this stage difficult often dangerous tedious and always mutilating (Fig 5)

Fibrosarcoma Fifteen cases 5 incorrect diagnoses of sarcoma which however did not lead to mutilating operations because in two in which amputation would have been indicated on such a diagnosis the patients refused this operation and submitted only to a local extirpation which in both instances was incomplete Yet both these patients are well seventeen and twelve years after operation

These two cases must prove that the diagnosis of a benign lesion is correct because gross and microscopic there is no difference between the tumors completely eradicated in 13 instances and these two incompletely removed



Fig Path No 3 80 Photomicrograph low power through tumor shown in Fig 4 Benign hyperplasia of epidermis pigmented vascular cellular growth beneath with spaces of various sizes lined by proliferating endothelial cells

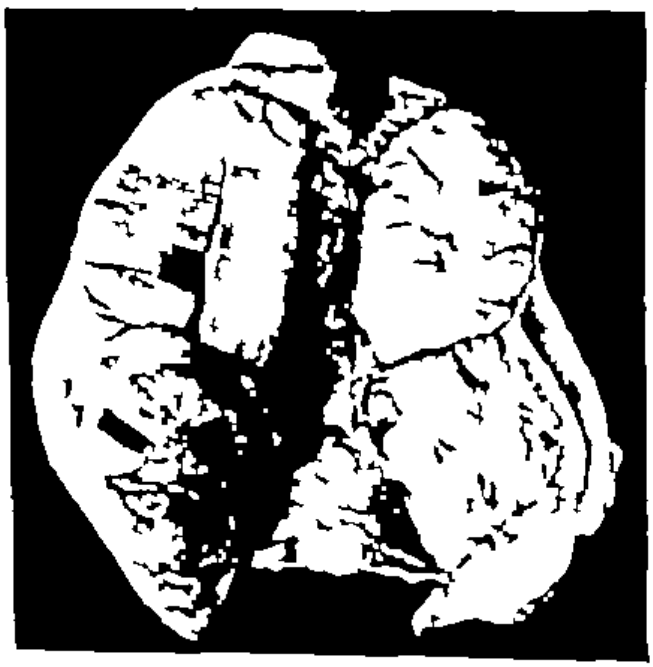


Fig Path No 3728 Sarcoma in fibroma, recurrent after enucleation Photograph of specimen removed The specimen has been cut and shows skin tumor and underlying muscle



Fig 18 Path No 3726 Fibro-spindle-cell sarcoma in fibroma See Fig 7 for gross appearance This represents very cellular area infiltrating muscle

Fibroangioma is apparently the result of an inflammatory reaction in a hæmangioma This reaction is either due to trauma or interference with the circulation The increasing tumor originally compressible and showing changes in size becomes harder the compressibility disappears, the change in size is not observed If it is situated near the skin the thin epidermis may ulcerate. In gross appearance we see two distinct types of tissue red, spongy vascular areas resembling capillary angioma and firm white areas more like fibrospindle cell sarcoma than fibroma. Even in the gross, pigmented areas may be seen Under the microscope in the vascular red areas, we see the picture of angioma. Frequently the blood spaces are plugged with endothelial cells giving the picture of an endothelioma. The white areas are cellular with varying amounts of eosin-staining fibrous tissue, and we see numerous areas of endothelial cells in nests in this cellular connective tissue Blood pigment from old hæmorrhage is observed in the cells of different types and in the stroma From a histological study these tumors are difficult to differentiate from sarcoma The importance of the differential diagnosis is present only when complete eradication would be mutilating. In 13 of the 15 cases, complete excision was possible without danger or mutilation. In three of these cases the operative diagnosis was sarcoma. All of these patients have remained well since operation In one case (Fig. 6) the tumor was present about the ankle joint, but the patient refused amputation. Tumor tissue was left attached to the tendon sheath. This patient is well (June, 1913) sixteen and one-half years since operation Fig 6 is a sketch of the clinical appearance, Fig 7 a sketch of the operative findings, Fig 8 a photograph of the gross specimen and Fig. 9 shows the microscopic appearance. In the second case the tumor was situated in the muscle of the thenar eminence of the right thumb The partially removed tissue was sent to the laboratory with the diagnosis sarcoma, tumor incompletely removed, patient refused amputation. This patient is well (June 1913) almost twelve years since operation.

Intermuscular angioma Nine cases 4 incorrectly diagnosed and one of these subjected to an unnecessary amputation of the thigh.

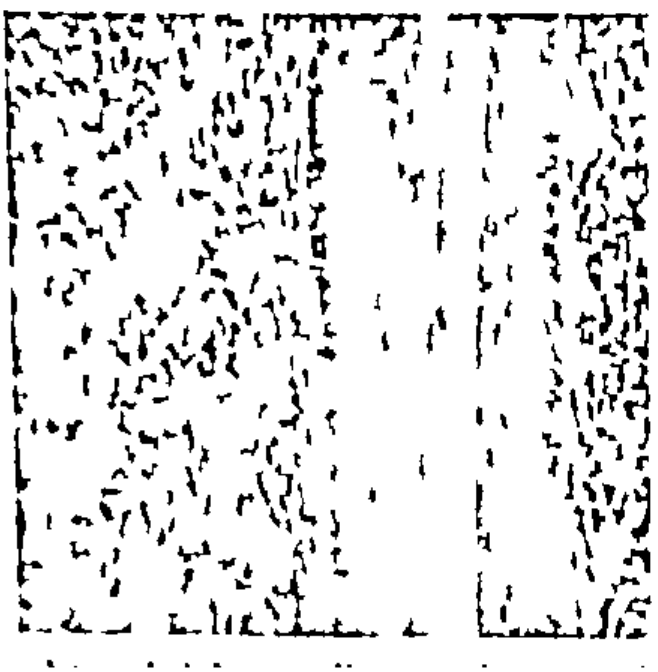
Intermuscular hæmangiomas should not be difficult to recognize. They appear as diffuse



Fig. 9 Path No 7432 Sarcoma (?) in skin scar. Photograph of patient. White female, aged 36 chronic acne and blackheads many years, indurations eighteen months, tumor nine months Incomplete excision No recurrence six and one half years

compressible swelling often visible externally (Fig 10) The swelling shows variation in size when the limb is lowered or raised or when constrictions are made on the veins above Often the superficial veins are dilated In some instances diffuse lipoma and multiple tuberculosis of the tendon sheaths may give a somewhat similar clinical picture At the exploratory incision numerous dilated veins are encountered and in and between the muscles one sees red spongy angiomatous tissue

Microscopically (Fig 11) we may find every type of an angioma from a capillary to cavernous The amount of stroma varies endothelial proliferation in the blood spaces is very common This tumor may be situated anywhere We have observed it three times near the masseter of the cheek twice on the forearm twice in the muscles of the calf of the leg and twice in the thigh With this experience one might feel quite certain that the differential diagnosis from an intermuscular sarcoma is not difficult Complete removal for the intermuscular hæmangioma is not necessary and need never be performed if such a procedure would be mutilating The scar tissue of the partial excision and in



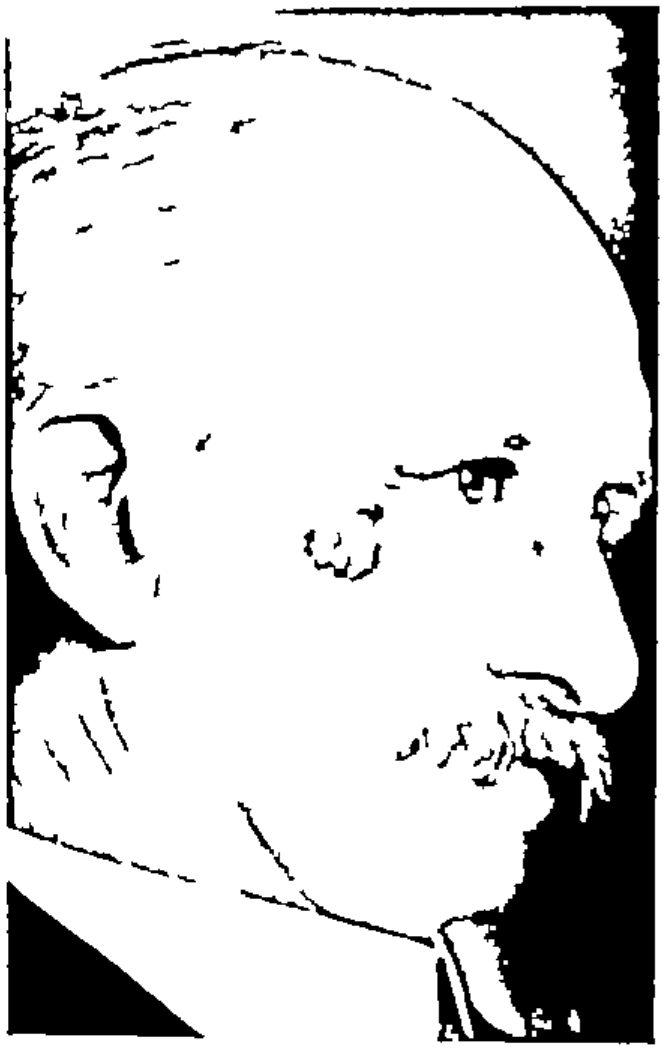


Fig [illegible] Pigmented fibroma of the skin after injury A piece of coal Complete local excision The area was similar to the one in both the sarcoma illustrated in Fig [illegible] developed

some cases the employment of the cautery will destroy the vascular tissue with little or no injury to muscle function

Granulation tissue tumors Thirteen cases Pieces of six of these tumors were sent to the laboratory diagnosed sarcoma and these patients were saved unnecessary and mutilating operation These granulation tissue tumors occur on the skin and are either due to the ulceration of a pre existing hæmangioma or to exuberant granulation tissue in a superficial wound A tumor of this kind presents a small fungus covered with granulation tissue not unlike an ulcerating sarcoma (Figs 1 and 2) In my experience the local growth is never as great as in the sarcoma Microscopically the tumor is very



Fig. Path. No. 2886. Round cell sarcoma in skin scar. Male, aged 33, pigmented nevi four years after trauma from lump of coal. Two years later growth in scar. Six months ago incomplete excision, immediate recurrence. The photograph shows the recurrent growth on forehead. This patient died in one year of internal metastases, no local recurrence. See Figs. 3 and 4 for gross appearance of the recurrent tumor excised.

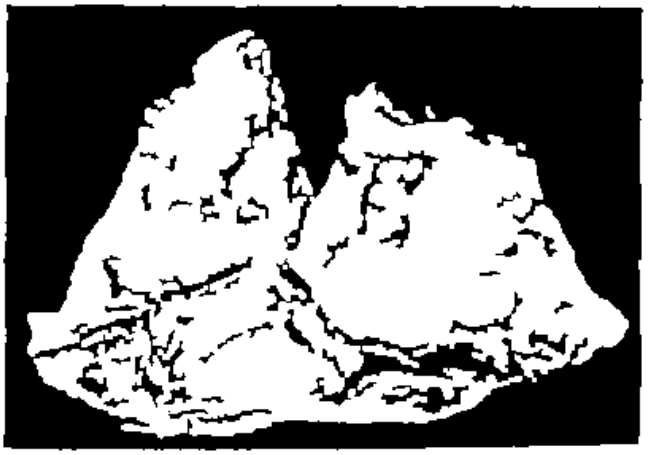


Fig. 24. Path. No. 556. Cross section through tumor shown in Fig. 24.

cellular but the endothelium-lined blood spaces (Fig. 4) are always more numerous than in sarcoma and the stroma is of the type of granulation tissue.

Angiosarcoma. In six cases of sarcoma of the skin arising in congenital nevi there has been one cure. In five instances the tumor when it came under observation was a fungus and inoperable from local growth or metastasis. In the history of all of these cases there had first been a local growth in a nevus quiescent for many years from four to seventy four years. The character of this local growth was sufficient to indicate immediate radical excision. The ulceration took

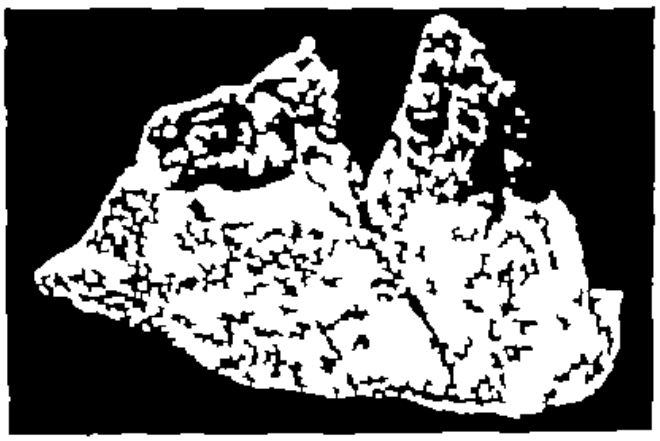


Fig. 3. Path. No. 2886. Surface of recurrent tumor excised from patient shown in Fig. Note peculiar ulceration.

place at varying periods after the onset of growth, from a few months to three years. It is impossible to say, of course, what these tumors looked like in the onset. When they came under observation they were very cellular friable vascular neoplasms resembling hemorrhagic brain tissue, microscopically round-cell sarcoma of the perithelial type. In the one case cured by radical excision the tumor situated in the skin of the thigh was the smallest observed. The local growth had been present about six months (Fig. 12). Histologically this tumor suggests that it might still be an angioma and not an angiosarcoma (Fig. 3). Endothelial blood spaces are still preserved but the tissue between them is very cellular and resembles sarcoma more than granulation tissue. This patient has remained well five years since operation.

It is my opinion that we should be able to recognize the development of a sarcoma in a congenital nevus and cure the majority of cases by immediate radical excision.

In nine cases of sarcoma of the skin resembling the previous cases clinically and pathologically there has been one cure. The duration of the nodule has varied from six weeks to seven years in patients whose ages varied from four years to seventy. Three had been present on the scalp and were clinically like an ordinary wen, one as a blood cyst of the cheek, one in the neck, two on the eyelid, one in the skin above the pubes, one near the ankle. In all of these cases there had been a definite trauma, and in some recurrent irritation.

The cured case began in a varicose vein near the external malleolus it recurred after the first excision and has now remained well two years after the removal of the recurrent nodule. Fig 14 illustrates a section through the small recurrent tumor It resembles somewhat the fibroangioma Figs. 15 and 16 are from a section of the recurrent tumor Histologically it suggests an endothelioma the pigment is due to hemorrhage. It is quite natural to ask, Is this an angiosarcoma or a fibroangioma?[1]

Among the 22 cases of angiosarcoma there is not a single cure. In 11 cases the lesion had been present years or longer in 11 cases months. Trauma is the most common etiological factor suggesting the possibility of the development of a sarcoma in the granulation tissue secondary to trauma or the effect of injury on a pre-existing angioma.

In none of these tumors was there any difficulty in making a diagnosis from the clinical appearance or the gross and microscopic pathology when they first came under our observation.

The differential diagnosis in this group if seen or explored early would have to consider and exclude tubercular myositis, syphilitic gumma, non-ossifying myositis, intermuscular angioma and fibromyxoma of nerve sheaths. I am unable to present exact methods based upon experience, because none of these lesions have presented themselves clinically in the early stage. The Wassermann reaction and therapeutic effect of salvarsan have so far in my experience allowed us to make the correct diagnosis in gumma. Tubercular myositis has always come under observation in the abscess stage. After a contusion to the soft parts if the resultant swelling does not disappear rapidly and the X ray shows no ossifying myositis, the lesion should always be explored. Only in this way will we get in the early and possible curable stage sarcoma secondary to trauma. The first appearance of a subcutaneous mass, whether it be circumscribed or diffuse should demand immediate investigation In the absence of a positive Wassermann it should be explored. Only in this way will we be able to treat sarcoma in the earlier stage. It must be remembered, however there may be great danger in these early explorations, if the surgeon is not qualified to make the differential diagnosis. The larger number of cases are benign. Especially is this true of traumatic myositis and organizing hæmatoma. Here operations on the diagnosis of sarcoma would be mutilating and unnecessary

[1] December, 1911 There is now a local recurrence in the scar, but no signs of metastasis Duration of disease now four and one half years, rather long for sarcoma.

Fibroma. I have records of 34 cases of fibroma of the skin and subcutaneous tissue, 13 desmoids or fibromas of the abdominal wall, 20 tendon-sheath tumors and 49 scar tissue tumors, or keloids — 116 tumors therefore, of the benign type. During the same time we have observed the following cases diagnosed sarcoma 20 cases in scars, 9 in fibroma, and 8 fibrospindle-cell tumors situated subcutaneously — in all, therefore 37 sarcomas. The more I study the cellular pathology of fibroma and fibrosarcoma, the less do I feel able to recognize the border-line lesion. Fortunately it makes little difference, except in a few cases. These tumors, as a rule, are circumscribed and can be completely and radically removed. If this is done, the majority are cured.

These tumors should never be removed by enucleation. Fig 17 illustrates a recurrent sarcoma situated in the skin over the shoulder blade. When it first appeared it was the size of a pea. After it had been present some months and had reached the size of an egg it was enucleated under cocaine. The tumor promptly recurred. Four months later when I saw the patient, the recurrent tumor was the size of two fists (Fig 25) It was now removed with a wide zone of skin, fascia and muscle and the area skin-grafted. The microscopic appearance of the tumor (Fig 18) is so cellular that I think we are perhaps justified in calling it a fibrospindle-cell sarcoma.

Keloids The ordinary benign keloid should not be difficult to recognize. These tumors often recur after complete excision Yet I have never observed a sarcoma to develop in a true keloid If the keloid is subject to trauma it may ulcerate.

In other cases the tumor developing in scar

tissue may be very difficult to distinguish from sarcoma. Fig 19 represents a tumor of the back developing after a long history of acne and blackhead formations. The area was excised eight years ago The microscopic pathology (Fig 20) demonstrates that the neoplasm is composed of a cellular tissue about hair follicles. This microscopic change was present up to the border of the tissue excised Nevertheless there has been no recurrence Many pathologists who have examined this section for me are of the opinion that it is a sarcoma. If it is, it is one that may be cured by incomplete removal.

Clinically I was of the opinion that this case was a carcinoma developing in hair follicles or glands of the skin secondary to chronic irritation of the acne. I removed the zone shown with a wide margin but when I studied the edges and found the cellular tissue present beneath the epidermis I felt that it was sarcoma. Metastasis must have taken place, and there was no indication to remove more than one fourth of the skin of the back. After careful investigation I concluded that it must be an inflammatory tumor The result has confirmed this.

There is no doubt that the most malignant sarcoma may develop in scars of different types. Fortunately I have observed examples of the beginning and the end of such lesions. Fig 21 illustrates an area on the face secondary to an injury with a piece of coal. It was pigmented, raised. Microscopically it shows cellular granulation tissue and coal pigment. It was removed a few months after the injury and there has been no recurrence.

Fig 22 pictures a man who had a similar area after an injury with a piece of coal on the forehead. Some years later when it increased in size it was incompletely removed on the diagnosis of keloid. The picture illustrates the recurrent tumor which was radically removed (Figs. 23 and 24) It proved to be a round-cell sarcoma. The coal pigment was still present. The patient died of internal metastasis.

THE POST-OPERATIVE RESULTS OF TRACHELORRHAPHY IN COMPARISON WITH THOSE OF AMPUTATION OF THE CERVIX

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IN the year 1862 it happened that Sims, on leaving the country for a visit to certain European clinics, referred to his associate, T A. Emmet, a patient who had suffered for years with an ulcerated cervix" and had become a confirmed invalid. After treating the case for some time by the usual methods and with the usual disappointing results, Emmet (1) one day while examining her more or less by accident discovered her real condition to be a bilateral laceration of the cervix, and immediately devised an operation to restore the cervix to its normal outline. Speaking of this discovery some twenty years later Wells (2) says 'Though for more than two centuries the thinking minds in the profession had recognized, more or less clearly the dependence of the then called ulcerations upon previous laceration of the cervix, no one seems to have realized fully the feasibility of curing the lesion by closing the laceration and the honor of inaugurating a new era in the treatment of these fissures was reserved for the clear seeing genius of Emmet who recognized and showed, as had no one before, the real nature and importance of this frequent ulceration of the parous cervix.

On November 27 1862 Emmet first performed the operation of trachelorrhaphy on Sims patient, with what proved to be brilliant results. It was not, however until eight years later when he had repeated the operation some two hundred times, that Emmet reported the technique of his procedure and the gratifying results obtained In a paper read before the Medical Society of the County of New York on September 28 1874 Emmet describes his first case in these words While making a digital examination one day I was puzzled to account for the greater width of the cervix in comparison to that of the body beyond, a condition I had for the first time appreciated I placed her on the left side and with a Sims speculum brought the cervix in view I drew the posterior lip forward towards me with no special purpose, when I was surprised to observe that it had decreased to nearly half its previous size. On lifting up the anterior lip with a tenaculum in the other hand so as to bring the two portions in approximation, the outline of a cervix presented of nearly a normal size. The difficulty was at once apparent, for the parts had rolled back within the uterine canal, and a deep lateral fissure became evident, which extended on each side entirely through the cervix and beyond the vaginal junction. On separating the flaps and forcing them back to their former position I saw the tissues gradually roll out, and the cervix again present its previous appearance. The remedy at once suggested itself." In discussing Emmet s paper at this meeting Sims (3) paid high tribute to his work with the statement We can t modify the operation We can t change it, for it is perfect—perfect in its method and perfect in its results. As much due to the support of such men as Sims, Thomas, Fordyce Barker and Goodell as to the really great importance of Emmet s discovery the operation almost immediately gained widespread use throughout America and England and before many years was practiced to some extent in Germany and France. In the latter countries, however it has never won the recognition and use it has so well merited.

In the April (1913) issue of this journal, the writer reported an analysis of the post operative results of the cases of amputation of the cervix performed in the Gynecological Clinic of the Johns Hopkins Hospital during the past twenty years, a complete post operative history having been obtained in 128 of the 400 cases recorded in the protocols of the department. The conclusions reached by an analysis of these cases were quite unexpected, and, in many ways disappointing

From the Gynecological Clinic of the Johns Hopkins Hospital.

Although the results obtained regarding the improvement in the general health and the cure or amelioration of leucorrhœa showed the operation to be highly efficient in these respects, the more important facts brought out by the analysis were in connection with the marital histories of these cases, following operation. Of those women in whom the occurrence of a pregnancy might naturally have been expected, four-fifths remained sterile. On the other hand over 50 per cent of the pregnancies occurring after operation ended by miscarriage or premature delivery while of the few remaining which progressed to full term, even a larger percentage experienced prolonged and difficult labors. The cases reported had all had a circular amputation of the cervix, on an average of about three centimeters of the cervix above the external os being removed, and on learning of the results obtained, Dr W W Russell at once suggested that the cases in which the cervix had been repaired by Emmet's method be followed up in order to afford a suitable basis upon which the two operations might be compared as to their therapeutic efficiency and their effects upon the subsequent marital history Accordingly a circular letter was sent to all the cases of trachelorrhaphy performed in this clinic during the past ten years. The number of complete reports received, although disappointingly small, is large enough to furnish a fair comparison of the remote results of the two procedures

POST-OPERATIVE HÆMORRHAGE

The danger of serious hemorrhage after amputation of the cervix has been shown to be very real. The occurrence of a discomforting ooze after this operation requiring the use of tight vaginal packs, is only too familiar On the other hand, alarming hemorrhage is by no means uncommon Of 128 cases in this clinic, 6 or nearly 5 per cent, bled so profusely at some time during the convalescence as to necessitate their removal to the operating room for resuture of the cervix In each of these cases tight vaginal packs had failed to control the hemorrhage.

Similar experiences were not unknown to the earlier operators after the performance of trachelorrhaphy although such cases were very infrequent. Thus, Goodell (4) reports but three instances of post-operative hemorrhage in over 200 cases of trachelorrhaphy in which it became necessary to resuture the cervix on this account, while Emmet reports the same number as occurring among some 600 cases. Severe post-operative hemorrhage in cases of trachelorrhaphy has been very unusual in this clinic and resuture of the cervix on this account has never been found necessary although in two of the cases reported herewith slight hemorrhage occurred, necessitating the use of vaginal packs.

In reporting the 6 cases from this clinic in which hemorrhage occurred after amputation of the cervix, it was pointed out that an added danger from this complication was that it might arise at any time during the convalescence, and even weeks after operation, when the patient had passed from the surgeon's observation. Similar cases of late post-operative hemorrhage have been reported as following trachelorrhaphy Wells (2) particularly having given warning of this danger in reporting several cases in which the hemorrhage occurred many days after operation.

In 2 cases of the series reported hemorrhage occurred of sufficient moment to require packing the vagina In one case, the bleeding began on the sixth day and in the other on the seventh The hemorrhage was easily controlled in both cases. When we consider that after amputation of the cervix, serious post operative hemorrhage occurred in nearly 5 per cent of the cases, it would seem that the comparative freedom from this danger after trachelorrhaphy justifies in itself, the choice of the latter operation whenever indicated

INFLUENCE OF AMPUTATION AND REPAIR OF THE CERVIX ON THE GENERAL HEALTH

A lacerated cervix is more often than not the seat of a chronic infection. That the removal of such a focus of chronic infection should be followed in a large percentage of cases, by a marked improvement in the patient's general condition is, therefore, not surprising After amputation of the cervix 91 per cent of 128 cases noticed such improvement. In 13 of these cases, amputation of

the cervix was the only operation performed, yet 11 of these or 92 per cent, reported improvement in the general condition. After trachelorrhaphy 34 out of 39 cases, or slightly over 87 per cent reported noticeable improvement in the general health, a result which compares very favorably with the amputation cases. It should be noted however that in this clinic trachelorrhaphy has only been chosen as the method of procedure in those cases presenting one or two more or less discrete lacerations and without a marked endocervicitis. A cervix badly infected or one showing multiple lacerations has almost invariably been amputated. For this reason the results of the two operations can not be quite fairly contrasted in their effects upon the general health. The fact remains, however that after each operation about 90 per cent of the patients are improved in general condition. The effect of other operations, simultaneously performed, must of course be taken into consideration in determining to what extent this improvement is due to the plastic operation on the cervix.

INFLUENCE OF AMPUTATION OF THE CERVIX AND TRACHELORRHAPHY ON THE GENERAL HEALTH

	No. Cases	No. Cases Improved	No. Cases Same	No. Cases Worse
Amputation of cervix alone or with perineorrhaphy	80	7 (91 %)	6	
Trachelorrhaphy alone or with perineorrhaphy	5	22 (88%)	3	
Amputation of cervix followed by abdominal section	48	41 (90%)		5
Trachelorrhaphy followed by abdominal section	4	(86%)		

The table brings out one fact very clearly the improvement in the general condition following either operation is not entirely dependent upon the abdominal operation performed (in most cases a suspension of the uterus and appendectomy). In each group it will be noted that the percentage of cases reporting improvement is about the same. Inasmuch as the plastic operation on the cervix was the only one common to all these cases the indication is that its share in producing these results must be, at least, a very important one. In 3 cases, trachelorrhaphy was the only operation performed and each of these report decided improvement in the general condition. In 12 out of 13 cases in which amputation of the cervix was the only operation performed, the same result was obtained. Of the 39 cases of trachelorrhaphy 5 reported no improvement in the general health. Two of these cases were operated upon recently while in 2 of the 3 remaining cases a very small laceration was resected, the operation being quite atypical. A consideration of the foregoing seems to justify the assertion that in properly selected cases trachelorrhaphy improves the general condition of the patient quite as markedly as amputation of the cervix.

LEUCORRHOEA

Leucorrhoea is the most common and frequently the most distressing symptom of cervical disease. Of the 167 patients requiring either amputation or repair of an infected or lacerated cervix 85 per cent complained of a vaginal discharge varying in severity from the slight but constant non-irritant leucorrhoea to the profuse foul, irritating discharge so often the result of a badly infected cervix, and in some instances sufficiently severe as to render the patient practically incapacitated. In this latter group as has been indicated above the cervix presenting a marked grade of endocervicitis has almost invariably been amputated the simpler operation of trachelorrhaphy being reserved for cases showing one or two discrete lacerations, with only a low grade endocervicitis. The results obtained in this group of 142 cases, contrasting the efficiency of amputation of the cervix and trachelorrhaphy in combating leucorrhoea of cervical origin, demonstrates the necessity for a thorough consideration of these indications before proceeding with either operation.

INFLUENCE OF AMPUTATION OF CERVIX AND TRACHELORRHAPHY ON LEUCORRHOEA

Leucorrhoea before operation	Amputation Cervix 100 cases	Trachelorrhaphy 33 cases
Cured	68 cases = 68 5%	4 cases = 4 5%
Improved	31 cases = 30 %	14 cases = 42 5%
No change	1 cases = 1 3%	5 cases = 15 5%
Worse		

It will be seen that in over 92 per cent of the cases, the discharge either disappeared entirely (62 5 per cent) or was noticeably diminished in amount (30 per cent) after amputation of the cervix. In these cases the cervix was usually the seat of a chronic endocervicitis of relatively high grade and the leucorrhœa proportionately profuse. Contrast now the results obtained in this respect by trachelorrhaphy remembering that in this group the endocervicitis present was usually but slight and the leucorrhœa a relatively unimportant symptom. It will be noticed that the percentage of cases cured is much lower (42 per cent as compared with 62 per cent) and that the percentage of cases in which the operation had no effect whatever on the leucorrhœa is more than twice as high. In 5 cases after trachelorrhaphy the discharge present before operation remained unchanged afterward. In 2 of these cases a very small laceration was resected by an atypical procedure, these 2 cases being among the five who also reported no improvement in the general condition after operation a rather significant coincidence In one other case the abdomen was first opened and the left tube and ovary removed for a chronic inflammatory condition probably of gonorrhœal origin It being found unnecessary to drain, the cervix was then repaired and the perineum restored Inasmuch as this patient had had an infection severe enough to require a laparotomy it is probable that a marked endocervicitis also existed at the time of operation and the cervix should probably have been amputated.

Any operative procedure on the cervix, in the presence of a chronic endocervicitis, tends to enliven such an infection temporarily The earlier operators and especially Emmet (1) recognizing this fact, laid great stress upon the importance of preliminary treatment calculated to reduce the endocervicitis present, before operating for the laceration The patients were often subjected to months of douching and local treatment before an operation for the closure of the laceration would be attempted. Van de Warker (5) was the first to dispense with all this troublesome preliminary treatment, believing that the closure of the laceration rendered the infection present more amenable to treatment. That even a latent endocervicitis is made temporarily active by either amputation of the cervix or trachelorrhaphy is well evidenced by the fact that almost without exception the 167 cases reported here left the hospital with a more or less profuse vaginal discharge, which continued for an average of about two months. For this reason it has been customary in this clinic to start warm vaginal douches about the ninth or tenth day after either operation, and on leaving the hospital to advise their daily use as long as the discharge continues. Occasionally this post-operative leucorrhœa will endure for a long time In 3 cases, after amputation of the cervix the discharge continued for more than two years and then ceased entirely in 2 cases, and underwent marked improvement in the other Amputation of the cervix is then an excellent means of treating intractible cases of endocervicitis, the results of this procedure as regards this particular consideration being excellent in over 90 per cent of the cases. On the other hand it is difficult to imagine how trachelorrhaphy could have any effect on a chronic endocervicitis other than to render it more amenable to treatment as indicated by Van de Warker When we contrast the effect of amputation of the cervix and trachelorrhaphy as to their efficiency regarding the cure of leucorrhœa of cervical origin, at least one important fact is made clear Although the repair of a lacerated cervix may render a mild grade of endocervicitis more amenable to treatment, trachelorrhaphy can not be considered as having any direct effect upon the infection present other than to enliven it, and that the presence of a marked endocervicitis should therefore be considered as a contra indication to its employment

THE EFFECT OF AMPUTATION OF THE CERVIX AND TRACHELORRHAPHY ON DYSMENORRHŒA

It is generally recognized that the occurrence of dysmenorrhœa in multiparæ is rather unusual, yet of 148 cases of laceration of the cervix treated by amputation or trachelorrhaphy in this clinic, only 30 cases or about 20 per cent, were entirely free from menstrual pain before operation Many comments as

to the rôle of cervical laceration in the etiology of dysmenorrhœa pelvic neuralgia, etc. can be found in the earlier literature, following Emmet's announcement of the importance of this lesion but no attempt to explain the mechanism of this relationship is made. That some relationship actually exists, however seems very probable from a consideration of the results obtained in these cases. As when considering the effect of the operation as regards the general condition of the patient, it is necessary again to note the influence of any other operation simultaneously performed, in producing a reduction in menstrual pain following operation. Accordingly the cases have been divided into two groups the first comprising those cases in which the plastic operation on the cervix was done alone, or in combination with the restoration of a relaxed vaginal outlet and the second including those cases in which the abdomen was opened. The results are summarized in the following table

INFLUENCE OF PLASTIC OPERATIONS ON THE LACERATED CERVIX IN THE REDUCTION OF MENSTRUAL PAIN

GROUP I

A *Amputation of Cervix Alone or with Perineorrhaphy*

Dysmenorrhœa before operation	55 cases
After operation —	
Less pain	29 cases, or 53%
More pain	5 cases, or 9%
No change	cases, or 38%

B. *Trachelorrhaphy Alone, or with Perineorrhaphy*

Dysmenorrhœa before operation	5 cases
After operation —	
Less pain	cases, or 80%
More pain	case or 7%
No change	cases, or 3%

GROUP II

A *Amputation of Cervix with Laparotomy*

Dysmenorrhœa before operation	37 cases
After operation —	
Less pain	3 cases, or 68%
More pain	6 cases, or 6%
No change	6 cases, or 16%

B. *Trachelorrhaphy with Laparotomy*

Dysmenorrhœa before operation	cases
After operation —	
Less pain	7 cases, or 64%
More pain	cases, or 18%
No change	cases, or 8%

The following facts are brought out by the above table

1 Of 148 cases of lacerated cervix 118 or 80 per cent, had dysmenorrhœa before operation.

2 In 62 per cent of these cases there was noticeable reduction in menstrual pain following operation.

3 Of 70 cases in Group I 41 cases or 59 per cent, had less menstrual pain following operation.

4 Of 48 cases in Group II 32 cases, or 67 per cent had less menstrual pain following operation

5 Following amputation of the cervix, in 59 per cent of the 92 cases having menstrual pain before operation the dysmenorrhœa was cured or improved.

6 Following trachelorrhaphy in 70 per cent of the 19 cases having menstrual pain before operation the dysmenorrhœa was cured or improved.

In 48 of these cases (Group II) the abdomen was opened. To what extent, then must this reduction in menstrual pain be ascribed to the abdominal operation, simultaneously performed? The question is answered in part by the table above, and quite fully in combination with the table to follow

ABDOMINAL OPERATIONS IN GROUP II

	A Amputation Cervix	B Trachelorrhaphy
Suspension of uterus and appendectomy	29 cases	8 cases
Removal of one tube and ovary	cases	case
Ligation of tubes	cases	case
Herniotomy		case
Cholecystostomy	case	
Myomectomy	3 cases	

It will be seen that in 37 of the 48 cases a suspension of the uterus and appendectomy were done, which might easily account for the reduction of menstrual pain in these cases The same may be said of the three instances in which the adenexa on one side were removed for chronic inflammatory disease and likewise might possibly also apply to the three cases in which a myomectomy was performed. In 43 of the 48 cases in Group II then, any reduction in menstrual pain following operation could not be justly ascribed to the operation on the cervix. Not so however with Group I Here 59 per cent of the 70

cases noted a reduction in menstrual pain — a result which could only be due to the plastic operation on the cervix. In 8 cases amputation of the cervix was the only operation performed. Four of these cases noticed marked reduction in menstrual pain after operation while the other four noticed no change. In 3 cases trachelorrhaphy was the only operation performed. Each of these cases noticed a decided decrease in menstrual pain.

The conclusion seems inevitable that laceration of the cervix bears some definite relationship to dysmenorrhœa in multiparæ when we consider that 62 per cent of 118 cases of lacerated cervix suffering with varying degrees of menstrual pain before operation were entirely relieved or improved by amputation of the cervix or trachelorrhaphy. The results of one operation are about as good as the other in this respect.

Influence of Amputation of the Cervix and Trachelorrhaphy Regarding the Subsequent Fertility of the Patient

The question of the influence of plastic operations upon the uterine cervix as regards the fertility of the patient has naturally been considered under two distinct heads. First that group of cases in which the operation is undertaken primarily with the idea of relieving a condition of sterility and, secondly those cases demanding surgical interference for disease of the cervix most of these women being multiparæ and the question of postoperative fertility being of secondary rather than of primary importance. The first group has received much attention in the literature notably through the work of Sims (3) Champetier de Ribes, Simpson Scanzoni Pozzi (6) Guibout (7) La Torre (8) Morisani (9) Mangin (10) Duponnois (11) Pescher (12) Doléris (13) etc — and all seem agreed that amputation of the cervix in cases of sterility due to such mechanical causes as hypertrophic elongation, bring very fair results. The question of the subsequent fertility of those patients coming to operation primarily for disease of the cervix has been practically neglected however most of the scant literature that has appeared being very unreliable on account of the faulty or entire lack of classification of the cases presented. In the following report, 167 cases are considered in which the full marital history following operation was obtained. The cases are divided into two classes on the following basis:

Class A. Married women under 40 years of age at the time of operation who are menstruating regularly now.

Class B (1) Women over 40 years of age at the time of operation (2) Cases who have passed or are at present in the climacteric. (3) Cases of double salpingectomy or other operation making subsequent pregnancy impossible or very unlikely. The cases of amputation of the cervix, 128 in number have been previously reported on a basis of this classification. It was found that of the 72 cases in Class A women in whom the occurrence of pregnancy would naturally be expected, but 14 cases or 19.4 per cent reported fertility following amputation of the cervix. In other words, although every one of these 72 women had borne one or more children before operation over four-fifths of them have remained sterile since. Of the 39 cases in which the cervix was repaired by Emmet's method 29 fall into Class A of this classification. Of this number 11 cases or 38 per cent have become pregnant since operation. According to these results fertility after trachelorrhaphy is just twice as frequent as after amputation of the cervix. The following tabulation is interesting in this respect.

FERTILITY AFTER AMPUTATION OF CERVIX

	No. Cases Class A	Av. Age at Time of Op.
	72 cases	30 yrs. 5 mos.
Fertility reported	14 cases = 19.4%	28 yrs. 4 mos.
Sterility reported	58 cases = 80.6%	31 yrs. 6 mos.

FERTILITY AFTER TRACHELORRHAPHY

	No. Cases Class A	Av. Age at Time of Op.
	29 cases	31 yrs. 7 mos.
Fertility reported	11 cases = 38%	31 yrs. 5 mos.
Sterility reported	18 cases = 62%	31 yrs.

It is evident that the age of the patients in this series of cases offers no explanation of the results obtained. Why then should the occurrence of pregnancy be relatively twice as frequent after trachelorrhaphy as after

amputation of the cervix? Any plastic operation on the cervix necessarily results in the formation of a cicatrix the extent of which is dependent upon the type of operation done and the manner in which healing follows i.e. by primary union or by granulation. After amputation of the cervix, the cicatrix resulting occupies a plane perpendicular to the long axis of the cervix and must contract, from all directions, toward the cervical canal This sphincter like action of the contracting cicatrix may cause a complete closure of the cervical canal with retention of menstrual blood and hæmatometra Several such cases have been reported and one example was seen in this clinic a few months ago The occasional occurrence of extreme cases, such as these indicates the possibility that the same process may occur to a lesser degree in a large number of cases there being developed a stenosis of the cervical canal, which though insufficient to cause hæmatometra might render impregnation very unlikely Considerable support is afforded such an assumption by the cases of amputation of the cervix reported. Of the 14 cases reporting fertility after this operation, 10 had two or more pregnancies. This result, taken into account with the fact that 80 per cent of Class A reported sterility would indicate that cervical stenosis is of frequent occurrence in the sterile group, for if fertilization should ensue in spite of the stenosis, the delivery following even though premature, would dilate the cervical canal sufficiently to render a second pregnancy much more likely of occurrence We would expect then, a high percentage of sterile women and repeated pregnancies in the fertile group—precisely the results obtained.

Considerably more attention has been paid to the question of fertility following the operation of trachelorrhaphy than amputation of the cervix During the twenty years following the introduction of Emmet's operation occasional comment has been made the question at one time being the subject of a very caustic debate between Murphy (14) of Washington and Van de Warker (5) of Syracuse Goodell (4) after operating on 169 cases, reported that he had heard of but 7 pregnancies following and agreed with Murphy that sterility usually follows the operation of trachelorrhaphy As no attempt was made to classify these cases, the results mean very little and as has been previously indicated, almost all of the reports that have appeared bearing on this question are practically worthless as no idea is given of the percentage of fertility in that group of cases, in which pregnancy might naturally be expected to follow This is well illustrated in the following tabulation which embodies the results of most of the reports which have appeared

FERTILITY AFTER TRACHELORRHAPHY

Emmet ( )	Operated upon	600 cases,	knew of many pregnancies
Thomas (5)	Operated upon	cases	knew of many pregnancies.
Sutton (6)	Operated upon	60 cases	knew of some pregnancies.
Lusk ( )	Operated upon	300 cases	knew of frequent pregnancies.
Skene (13)	Operated upon	300 cases	knew of many pregnancies
Goodell (4)	Operated upon	69 cases,	knew of 7 pregnancies.
Mundé (7)	Operated upon	37 cases	knew of 3 pregnancies.
Jackson (8)	Operated upon	8 cases,	knew of 9 pregnancies
Lee (19)	Operated upon	00 cases	knew of pregnancies
Mann (20)	Operated upon	50 cases	knew of 4 pregnancies
Wilson ( )	Operated upon	00 cases	knew of 4 pregnancies.
Baer (5)	heard from	cases;	6 became pregnant
Montgomery (43)	heard from	30 cases,	5 became pregnant.
Beates (46)	heard from	13 cases,	became pregnant.
Ill (47)	heard from	44 cases	became pregnant
Van de Warker (5)	heard from	3 cases	9 became pregnant
Jarvis (44)	heard from	5 cases	3 became pregnant.
Johnson (45)	heard from	6 cases;	3 became pregnant
Richardson (39)	heard from	7 cases,	3 became pregnant.

A number of authors, more notably Goodell (4) Murphy (14) and Gehrung (24) concluded that sterility follows the operation as a general rule and attributed this sterility to the operation itself Baer (25) although agreeing that sterility ordinarily follows attributed it not to the operation but to the inflammatory condition of the cervix accom

panying laceration and upon which the operation has no effect. Wells (2) however in 1884 seems to voice the general consensus of opinion at that time He writes When we take into consideration the number of abortions, the tendency to which all admit to be much increased by the lacerated and irritable state of the cervix it is obvious that the operation materially swells the number of births at term not only by enlarging the number of conceptions but also by lessening the number of abortions, so that we may *safely say that Emmet s operation increases* the fertility of those on whom it is performed."

It has been pointed out that the cicatrix following an amputation of the cervix occupies a plane perpendicular to the long axis of the cervix, and in contracting must narrow the cervical canal to some extent The scar left by a trachelorrhaphy is rather linear than broad and occupies a position parallel with the long axis of the cervix. In contracting it is inconceivable how such a cicatrix could narrow the cervical canal Granting that sterility following a plastic operation on the cervix is due usually to a stenosis of the cervical canal the relatively greater fertility of the patients after trachelorrhaphy than after amputation finds an easy explanation in the *extent and situation of the scar tissue left* by the operation. At any rate, it is safe to conclude that fertility is much more likely to follow trachelorrhaphy than amputation of the cervix

THE COURSE OF PREGNANCY AFTER AMPUTATION OF THE CERVIX AND TRACHELORRHAPHY

Audebert (26) and De Koninck (27) have insisted that amputation of the cervix exercises a marked influence on the course of subsequent pregnancies by causing very frequent abortion and premature delivery Bernheim (28) reporting 49 cases, concluded that this is not true but his evidence is overweighed by the work of Pescher (12) Pedobedoff (29) Gulbout (7) Ducasse (30) and numerous others who ha e noticed this tendency to abortion following the operation The comments to be found in the literature regarding the effect of trachelorrhaphy on the course of pregnancy are few but uniformly favorable the general opinion being that the operation decreases the frequency of abortion.

In the following table the influence of amputation of the cervix and trachelorrhaphy on the relative frequency of abortion before and after operation is shown and demonstrates the superiority of the latter operation in this regard

COURSE OF PREGNANCY AFTER AMPUTATION OF CERVIX

14 CASES

Before operation, 52 pregnancies	
Delivery at term	39, or 75%
Interrupted before term	13, or 25%
After operation, 33 pregnancies	
Delivery at term	14, or 45%
Interrupted before term	17 or 55%
Now pregnant	

COURSE OF PREGNANCY AFTER TRACHELORRHAPHY

11 CASES

Before operation, 73 pregnancies	
Delivery at term	54, or 74%
Interrupted before term	19, or 26%
After operation, 29 pregnancies	
Delivery at term	21 or 72%
Interrupted before term	8, or 28%
Now pregnant	

It will be seen that in each group of cases, 25 per cent of the pregnancies occurring before operation ended before term, this frequency possibly being attributable to the lacerated condition of the cervix. After operation however the frequency of abortion differs widely according to the type of operation performed. After amputation of the cervix, the liability to abortion is more than doubled while trachelorrhaphy has no effect upon the course of subsequent pregnancy

Taking the cases singly a number of *interesting observations can be made* corroborating the above conclusion

PREGNANCIES AFTER AMPUTATION OF THE CERVIX

	Delivery at term	Premature delivery	Abortion
Case I			
Case II			
Case III		(8th mo.)	
Case IV	3		
Case V		(7th mo.)	
Case VI		(8th mo.)	
Case VII	(now pregnant)		

Including termination of pregnancy up to 6th month.

Case VIII		(7th mo & 8th mo) (6½ mos)	
Case IX			
Case X			3
Case XI			
Case XII			
Case XIII			
Case XIV			
	4=45%	6=9%	3=36%

PREGNANCIES AFTER TRACHELORRHAPHY

	Delivery at term	Premature delivery	Abortion
Case I	4		3
Case II			
Case III			
Case IV	3		
Case V			
Case VI		0	
Case VII	3		
Case VIII			
Case IX	3		
Case X			
Case XI	(now pregnant)		
	7=78%		3=33%

In the first place, the relatively low percentage of full term deliveries after amputation of the cervix is apparent. Perhaps the most striking fact in the table, however is the frequency with which premature delivery from the sixth to eighth month occurs after amputation of the cervix. In six instances out of 31 or in about 19 per cent of the pregnancies premature delivery ensued and in case 8 the only two pregnancies occurring after operation terminated by premature delivery one at the seventh and one at the eighth month. On the other hand, not one of the 29 pregnancies occurring after trachelorrhaphy ended by premature delivery Aside from the relatively greater frequency of abortion after amputation of the cervix, as compared with trachelorrhaphy it is likewise of considerable interest to note that of the 14 cases in the first group (amputation of the cervix) only three cases, VII XII and XIII carried each pregnancy to full term while after trachelorrhaphy in 5 of the 11 cases II IV VI VIII and X each pregnancy progressed to full term. It is evident that after amputation of the cervix, premature delivery is frequent as well as abortion and that this objection does not apply to trachelorrhaphy

*Including termination of pregnancy up to 6½ months.

THE CHARACTER OF LABOR AFTER AMPUTATION OF THE CERVIX AND TRACHELORRHAPHY

Post-operative cicatricial rigidity of the cervix has long been recognized as a cause of dystocia. Before the introduction of a plastic amputation of the cervix by Sims (3) in 1861 the occurrence of dystocia, in the occasional pregnancy following the crude procedures then in use, must have been almost invariable. With the use of plastic methods of amputation securing primary union of the tissues, many authors claim that dystocia due to cicatricial rigidity has become almost unknown. Among these may be mentioned Porro (6), Pichevin (31) Dolèris (13) Bernheim (28) Morisani (9) Ducasse (30) and Challeux Vivie (32) On the other hand, Guibout (7) Audebert (26) De Koninck (27) Lepage (33) Toledo (34) Martin (35) and many others have shown that dystocia after amputation of the cervix is not only of frequent occurrence but that it may reach any extreme even causing rupture of the uterus.

After trachelorrhaphy dystocia has evidently but seldom been met with for references to its occurrence are very scarce. Murphy (14) who could find nothing to recommend the operation concluded (from 11 cases collected from literature) that the character of labor is unusually severe and protracted. In this opinion however he is quite alone. Goodell (4) Mundé (17), Hanks (36) Lee (19) Githens (37) Ford (38) Jackson (18) Mann (20) Lusk (23) Wilson (21) Richardson (39) Skene (23) Jenks (40) and Scott (41) have all expressed themselves to the effect that trachelorrhaphy is without influence upon the character of subsequent parturition. A study of the cases from this clinic seems to corroborate the general consensus of opinion regarding the influence of both amputation of the cervix and trachelorrhaphy in this respect.

DELIVERY OF THE FIRST CHILD AFTER AMPUTATION OF THE CERVIX

	Before operation	Age† yrs.	Character of first labor after operation
Case IV	para II	27	Difficult labor, full term
Case V	para VIII	36	Premature delivery 7th mo. Difficult labor

†At the time of the first delivery following operation.

Case VI	para II	26	Premature delivery 8th mo Easy labor
Case VII	para I	28	Difficult labor, full term
Case VIII	para V	37	Premature delivery 8th mo Easy labor
Case IX	para I	32	Difficult labor, full term
Case X	para II	27	Easy labor full term
Case XI	para V	29	Easy labor, full term
Case XII	para I	37	Difficult labor full term
Case XIII	para III	35	Difficult labor full term
Case XIV	para II	26	Difficult labor full term

DELIVERY OF THE FIRST CHILD AFTER TRACHELORRHAPHY

	Before operation	Age* yrs.	Character of first labor after operation
Case I	para I	22	Prolonged 8 hours. Full term
Case II	para IV	42	Easy labor Full term
Case III	para VII	37	Difficult labor Full term
Case IV	para VIII	34	Easy labor Full term
Case V	para VII	40	Easy labor Full term
Case VI	para IV	33	Easy labor. Full term
Case VII	para VII	4	Easy labor. Full term
Case VIII	para VII	37	Easy labor Full term
Case IX	para I	3	Easy labor Full term
Case X	para II	3	Easy labor Full term
Case XI	para VI		Now pregnant (7 mos.)

* At the time of the first delivery following operation

A glance at the above tabulation is sufficient to offer convincing evidence of the great difference in the character of the first labor after the two operations. Following amputation of the cervix, the first labor was difficult in 7 of the 11 cases, in one instance (Case V) the delivery of a seven months child being attended with considerable dystocia. In striking contrast to this result is the fact that 8 of the 10 cases of full-term pregnancy following trachelorrhaphy had easy labors. In only one case was labor difficult, and in one other prolonged to 18 hours. Reamy (42) attended 6 of his cases at the first labor after trachelorrhaphy In 2 cases, dilatation of the cervix was rather slow but each of 15 other cases heard from had normal labors Hanks (36) Githens (37) Ford (38) Jackson (8) Mann (20) Wilson (2) Lee (19) Richardson (39) Harrison (43) and Janvrin (44) have reported a total of 34 cases seen in labor some time after trachelorrhaphy in 29 of which labor was normal, parturition in the remaining 5 cases being described as difficult or prolonged.

The question of relaceration of the cervix during the first labor after operation has been the subject of considerable discussion In only one of Reamy' cases was the cervix relacerated Mundé reported relaceration in about 20 per cent of his cases. Wells reporting 77 cases of trachelorrhaphy collected from the literature found that in 62 cases, or 80 per cent, the cervix was not lacerated during the first labor after operation while of the remaining 15 cases, 8 were but slightly lacerated. Unfortunately a reliable report on the cases from this clinic, regarding this point, could not be obtained.

Whether relaceration of the cervix occurs commonly or not, we may at least safely conclude that dystocia, due to cicatricial rigidity of the cervix, is common after amputation, while following trachelorrhaphy is unusual

I wish to express my thanks to Dr Howard A. Kelly from whose clinic in the Johns Hopkins Hospital these cases are reported, and to Dr Wm W Russell, my gratitude for his interest in the work and the many valuable suggestions he has offered.

CONCLUSIONS

1 The presence of a marked endocervicitis should be considered as a contra-indication to the performance of trachelorrhaphy

2 Although serious post-operative hemorrhage is not infrequent after amputation of the cervix (5 per cent) this accident is very uncommon after trachelorrhaphy

3 The influence of trachelorrhaphy in improving the general condition of the patient is, in properly selected cases, quite as marked as that of amputation of the cervix. In each instance about 90 per cent of the patients report improvement in the general health.

4. Although trachelorrhaphy may render a mild endocervicitis more amenable to treatment, it can not be considered, like amputation of the cervix as a curative measure for this condition

5 Laceration of the cervix is a frequent cause of dysmenorrhœa in multiparæ and its removal by either amputation of the cervix or trachelorrhaphy is followed by the disappearance or amelioration of menstrual pain in over 60 per cent of cases.

6 Fertility is much more likely to follow trachelorrhaphy than amputation of the cervix.

7 After amputation of the cervix, the incidence of abortion and premature delivery is greatly increased while trachelorrhaphy has no effect upon the course of subsequent pregnancy

8 Labor after amputation of the cervix is usually difficult, while after trachelorrhaphy it is almost always normal

9 Amputation of the cervix is an operation to be avoided in women in the child bearing period until all other therapeutic means have been exhausted

10. Trachelorrhaphy has a therapeutic efficiency in properly selected cases, quite as high as amputation of the cervix and having no influence upon the subsequent marital history of the patient, is the operation of choice for women in the child-bearing period

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SYPHILIS OF BONES AND JOINTS

With a Report of Ten Cases

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THOUGH syphilis of the bones and joints is not seen in our orthopedic clinics as often as the tubercular affections, still it is said with assurance that more patients are afflicted with syphilis of the bones and joints than are reported in the literature Many cases of bone syphilis are unrecognized or diagnosed as tubercular The reason is merely that we have not enough signs as yet by which to recognize this affection early

Even if we could succeed in obtaining specimens in an early stage, we would not easily verify the diagnosis for the reason that the histologists give us no definite histological findings by which to differentiate this condition from other similar ones.

It is, therefore, of the utmost importance that every case of syphilitic disease brought to the observation of the orthopedist should be placed in the medical literature and perhaps in this way some cases may be diagnosed early and proper treatment may be instituted. The prognosis of the luetic attack of the bones and joints is much more favorable than general syphilis and early treatment is therefore of special importance.

This justifies the writer s reports of those cases that came to his attention during the last year Since he was fortunate enough to have patients showing different varieties of bone and joint syphilis it will not be out of place to give a short résumé of the symptoms and the signs known up to recent date concerning the changes in those tissues

A BONE LESIONS

Bone lesions occur commonly in the hereditary form and in the tertiary stage of the acquired disease

I *Hereditary syphilis* (*a*) Early forms of hereditary syphilis occur soon after birth It takes the form of an osteochondritis and involves several bones The lower extremities are the first ones to be attacked Gelatinous masses are formed beneath the periosteum and at the epiphyseal line, producing occasionally true fractures of the shaft or separation of the epiphysis. There is a thickening of the periosteum and bone cortex. The cartilage is also involved, namely there is a multiplication and irregularity of the cartilage cells of the ossifying layer and premature calcification. Necrosis may be present, as shown by a zone of hard dry yellow substance in the ossifying layer The newly formed bone is softened and replaced by granulation tissue. If the disease is progressive ulceration and suppuration may follow The cartilage may be destroyed and growth stopped The fact that it involves the diaphysis sparing the joint differentiates this condition from a diffused tuberculosis The absence of high temperature and comparative mildness of the symptoms in proportion to the large area of bone involvement differentiates It from osteomyelitis On account of the swelling of the soft parts the condition simulates true joint lesion but a careful examination will elicit the fact that the joint is usually free. The cartilages of the ribs are also commonly involved.

Case M S female age 3½ years born in the United States of Italian parents. Mother brought the baby t Vanderbilt Clinic, complaining that the child never walked The child had no night cries and no fever at any time ( ) Examination showed very undernaured child The upper extremities and the ribs showed deformities simulating rickets. The child had no teeth whatever Many glands were enlarged The spinal motions free The left hip showed muscular spasm The thigh was kept flexed position t an angle of 0° The spasm could be easily overcome There was ery little limitation of motion in the hip At the junction of the upper and middle third of the thigh and the outer surface there as marked swelling with an opening toward the surface The swelling as not red A profuse thin greenish discharge could be pressed out from the tumor by the slightest pressure Mother related that the swelling occurred bout one

year ago and at the same time the discharge started. This was really the first thing that called mother's attention and induced her to consult her family physician. The discharge could not be stopped by him in spite of all his efforts by ointments and dressings. The fact that the child was unable to walk grieved the mother and she came to the clinic.

On further examination it was found that the other thigh had also some swelling of the femur but no discharge and also some limitation f motio in the hip. As the mother was a foreigner and ignorant it was hard t obtain satisfactory history of syphilis but it seemed that she had had tw o three miscarriages

The patient was examined by Prof V P Gibney who diagnosed it as hereditary syphilis Unfortunately the case disappeared from beervation and we could not take radiographs, Wassermann and other syphilitic tests but the diagnosis of such a reliable diagnostician as Gibney can be relied on The clinical facts here given show also the real nature of the case. We can easily see that the main lesion was at the epiphyseal junction of both femora There probably was necrosis and suppuration, which opened afterwards at the surface.

(*b*) In late hereditary syphilis cortical thickening and calcareous deposits beneath the periosteum are common, giving rise to sabre-shaped tibiæ and tender fusiform swellings along the shafts of the long bones. Frequently small areas of rarefaction with a cap of dense bone raised above the line of the normal shaft are seen in the skiagraph. These have been called bone blisters.' Beneath the periosteum can frequently be found a calcareous deposit which appears as a faint area bulging along the shaft and resembling early callus. It is confused usually with early osteomyelitis proper or osteomyelitis serosa or periostitis albuminosa or certain cases of giant-celled and periosteal sarcoma. An important aid in the diagnosis of hereditary syphilis is the presence of keratitis.

Case D J male, age 9, born in the United States, motorman Family history Parents alive and well, but father and mother live separated Both parents denied syphilis (according to the patient s report t his second visit) Patient does not know whether his mother had miscarriages not. Personal history Has always been healthy and does not remember ever having been sick Denies ever having had sexual intercourse Does not use alcoholic beverages. Present illness dates back six months, when patient noticed swelling on the left tibia on inner urface Does not remember any trauma that might ha e produced it. Had no pain whatever when ailment started About one month later he noticed a small opening at the middle f the tibia. A small amount of blood exuded causing no pain whatsoever About the same tim a similar opening and bloody discharge occurred at the right tibia. Both openings closed. Lately the swelling of the left tibia has been increasing, giving rise to slight pain and making the process of walking uncomfortable, but had no pain at night. Came to the Vanderbilt Clinic in January 19 3.

Physical examination The young man was robust and well built slight saddle-shaped nose. Teeth showed no Hutchinson s peculiarities. The cervical, axillary trochlear and inguinal glands were enlarged. There was a marked irregular swelling on the inner surface of the left tibia extending from inner tuberosity to about the middle of the tibia where a small opening covered by a scab was observed This tumor was not tender The joint was freely movable. No other bone was involved. The skiagraph (Fig 1) show that the periosteum is very thick and there is dense bone raised above the line of the normal shaft The faint area bulging along the shaft beneath the periosteum is probably calcareous deposit. The Wassermann reaction was very strongly positive (four plusses) This case is probably a late hereditary syphilis, as he had no symptoms of first and secondary stages.

II. *Acquired syphilis* The affection of the bone usually occurs in the tertiary stage. The pathological findings are the same as in late hereditary form. In acquired syphilis we have also bone gummata in the third stage, of which there are two forms, (1) superficial and (2) deep

1 The superficial gummata occur between the bone and the periosteum causing ulcera tions of the cortex. The gummata may join each other in a stellate manner Tousey points out the following radiographic findings in superficial gummata — on one side of the bone, the corticals are thinned by irregular patches of rarefaction Its uniform outline can no longer be traced. The periosteum is intact over a swelling which shows more or less ossification. At the extreme margins it is clearly noticeable that the swelling is a peri osteal one as the bony contour is preserved with the less dense shadow of the periosteum springing away from it.

2 The deep gummata occur in any part of the bone and may cause fracture.

Patient may have diffused syphilitic osteomyelitis which does not show on the radiograph Syphilis may produce vertebral le sions and simulate Pott's disease.

B JOINT LESIONS

It is an established fact that syphilis plays an important part in causing arthritic symptoms though frequently not diagnosticated

I Hereditary joint lesions Von Hippel found that 56 per cent of hereditary syphilitics show joint lesions. Kaufman in "Special Pathology asserts that they usually take the form of exudative arthritis caused by a neighboring gumma or an osteochondritis breaking through the epiphysis into the joint. Kirmisson and Jacobson classified the hereditary forms of syphilitic joint disease as follows 1 A single osteo-arthropathy beginning insidiously with severe and persistent nocturnal bone pain. One of the bony extremities enlarges and the condition simulates tumor albus. Hyperostoses may be present. The limitation of motion is usually mechanical. 2 The important feature may be only hydrops The synovia is thickened locally or diffused but there are no bony changes The fluid of the joint is markedly increased 3. Deforming osteo-arthropathy where the epiphyses are irregular

II Acquired syphilitic joint lesions The primary stage may be accompanied by acute fibrile arthritis (Goldthwait, Osgood and Painter) In the secondary stage we usually have *(a)* simple arthralgia without objective symptoms. Pain is distinctly localized over tendons and ligaments and is worse at night, probably due to pressure from distended veins. *This form very rapidly yields to mercurial treatment* (*b*) Subacute arthritis characterized by slight effusion and swelling with white or only slightly reddened joints. *This form is rare* (*c*) Hydrops, i e where the increase of the fluid is the first symptom The course is slow and insidious The knee joint is mainly involved

In tertiary syphilis the joint together with the bone or the joint itself may be involved We have therefore two types (*a*) Synovial type where a marked effusion is followed by a gradual onset The pain is sharp This form is usually monoarticular and mostly affects the knee Motion of the joint is normal Considerable muscular atrophy accompanies it (*b*) Bony type in which we find marked hyperostosis The extremities of the bones become enlarged, smooth and rounded. Pain is greater at night. May result in ankylosis or great relaxation and hypermobility Gummata may also be present in the arthritic lesion We have two types of articular gumma (*a*) periosteal, or capsular which spreads into the articulation and produces villi containing minute gummata. This form usually produces destructive changes in the cartilage and the bone (*b*) Primary osteal form extending into the joint producing destructive changes in the bone and the cartilage and may result in suppuration and ankylosis.

CASE 3. A P female married, age 3 born in the United States of Irish parents. Family history is negative Personal, has always been well. Married at seventeen, husband was twenty-one has *three healthy children and has had no miscarriages.* Husband denies syphilis. Previous history Had a cataract since the age of fi

Present illness dates back one and a half years, when patient began to complain of severe pain in the *left knee. The knee became swollen but not red.* In four weeks the motion of the joint became limited, so that patient could not extend the leg more than to an angle of 135° The pain was more severe at night. Patient gave history of trauma six months *previous to the occurrence of the swelling but it really* had nothing to do with the disease. This trauma occurred in a railroad accident and she attributed the knee affection as a sequence to it while bringing action against the company The truth of the *writer assumption that the knee affection had* nothing to do with the injury is verified by the fact that on taking her history for the first time she did not mention anything about the injury It was only after consulting her legal attorney that she mentioned the injury We mention this for the reason that on frequent occasions one may attribute such an attack to the trauma and not think at all of syphilis She came to the Clinic on July 26, 9 3

The physical examination showed a healthy robust young woman Station A Romberg Gait Walked with limp, bending toward the left side Eyes reacted normally to light and accommodation (Cataract on left eye) Some glands were palpable The left knee was very large The outline of the knee was abolished Patella freely movable though slight tenderness limited on touch Motion revealed pain and patient could not extend knee more than to angle of 35° No grating be joint A new bodies No pain on jarring not relieved much by traction A radiograph (Fig) was taken at that time which showed thickening of terminal border of the periosteum of femur irregular outline raised in some places. The patella was removed from femur A destruction of bone so marked too A fracture visible. The synovial membrane was not shown very clearly



Fig. Case February 13 0 3 X, left leg. Note the thickening of the periosteum dense bone raised along the line of the normal shaft b faint area bulging along the shaft of the periosteum is probably cal reous deposit Unfortunately be osteo bondreal knife did not come out ell t show whether there is the h rau rue osteo-chondritis B right leg no thickening of periosteum

I onsidering the diagnosis tuberculosis could be ruled out t once as a fluctuo lasting for yea nd a half would how mo symptoms and mor destruction of bone Osteomyelitis eliminated



Fig. Case Before starting an treatment Sep ember A lateral view B on posterio ior b bearing of periosteum b irregu outline of periosteum There is no dou ss no rarefac n or new f rmation No marked separa n of pe f m femur



Fig 3 Case 3 February 1 0 3 The periosteum is markedly thickened on both sides, especially t a, though the pain markedly diminished There is no destruction The cartilage is almost normal.

n ccount of lsence of fever nd cut raptom Chronic s novitis — hows no r lographic hange of th bones S oma has no ncrease of fluids (Gonorrhoeal rthritis — by the omparat ve mild ymptoms We therefore believed that it s probabl syphil tic joint The patient had ber taki g some medicine prescribed by pri te ph si n, but could not ascertain whether t at philitic treatment W d l not therefor t k W sserma test Mea hil immobilized the knee in removable plaster t nd I used the use of Bier's h peraemia for t t four hours last P tient used also pplications of hot and cold dou hes before retiring After few months tre t ment th lling w markedly diminished Pa ber mobile especially dur g the night Could bring the leg p almost t tra ght line th the thigh Tenderness w les W told t ont nu t ll tre tme t th the limitation of excursions for ten to fifteen mi utes t la The improvement con t ued W then t k W sserm test which ca e trongly positive f ur pl ces Th radiograph t th t i e Fig t howed th f llow g findings Th periosteum more thickened both border f the femur more irregula but no destruct on ev dent ctic of the l mes fo ced J t s lear

B. JOINT LESIONS

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CASE 3. N. P., female, married, age 32, born in the United States of Irish parents. Family history is negative. Personal, has always been well. Married at seventeen, husband was twenty-one, has three healthy children and has had no miscarriages. *Husband denies syphilis. Previous history:* Had a cataract since the age of five.

Present illness dates back one and a half years, when patient began to complain of severe pain in the left knee. The knee became swollen but not red. In four weeks the motion of the joint became limited, so that patient could not extend the leg more than to an angle of 135°. The pain was more severe at night. Patient gave a history of trauma six months previous to the occurrence of the swelling but it really had nothing to do with the disease. This trauma occurred in a railroad accident and she attributed the knee affection as sequence to it while bringing action against the company. The truth of the writer's assumption that the knee affection had nothing to do with the injury is verified by the fact that on taking her history for the first time she did not mention anything about the injury. It was only after consulting her legal attorney that she mentioned the injury. We mention this for the reason that on frequent occasions one may attribute such an attack to the trauma and not think at all of syphilis. She came to the Clinic on July 26, 1912.

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Fig. Case February 3, 9 3 A, left leg Note the thickening of the periosteum a, dense bone raised abov the line of the normal shaft b, faint area bulging along the shaft of the periosteum is probably calcareous deposit Unfortunately the osteo chondreal line did not come out well t show hether there is the characteristic osteo-chondritis B right leg no thickening of periosteum.

In considering the diagnosis t berculosis could be ruled out at once, as an affection lasting for yea and a half would show more sympt ms nd more destruction of bone Osteomyelitis was eliminated



Fig Case 3 Before starting any treatment September 27 9 A, lateral view B antero-posterior iew a, thickening of periosteum b, irregular outline of periosteum There is no destruction no rarefaction, nor fracture Not marked separation of patella from femur



Fig 3 Case 3 February 3 19 3 The periosteum is markedly thickened on both sides, especially at a, though the pain as markedly diminished There is no destruction The cartilage is almost normal.

on ccount of bsence of fever and cute symptoms Chronic synovitis — shows no radiographic change f the bones Sarcoma has no increase of fluids Gonorrhoeal rthritis — by th comparative mild symptoms We therefore believed that it was probably syphilitic joint The patient had been taki g som medici e prescribed by a private physi cian, but w could not ascertain whether it was ntil syphilitic treatment We did not therefore take a Wassermann test Meanwhile we immobilized the knee in removable plaster cast and advised the use of B er hyperemia f two to four hours daily Patient used also pplications of hot and cold douches before retiring After a few months treat ment the swelling was markedly diminished Pain became less, especially during the night Could bring the leg up lmost t straight line with the thigh T nderness was less Was told t continue the treatment w th the addition of exercises for ten to fifteen minutes twice day The mprovement con tinued W then took Wassermann test which was ery strongly positive (four plusses) The radiograph t that time (Fig 3) showed the follow ing findings The periosteum more thickened o both borders of the femur more irregular but no destruction or rarefaction of the bones found Joint s clear



Fig 9 Case 6 Both knees The destruction of the bone is visible especially at the extremity of the femur Some hypertrophy can also be noticed

no local pain or sensitiveness but weakness and distortion of the limb The joint most commonly involved is the knee

CASE 5 F L F, *male single, age fifty-four* born in the United States, patient in Montefiore Home *Family history negative Personal History* Patient admits having had several attacks of gonorrhea Had chancre thirty-four years ago followed by secondary syphilitic symptoms had also some bone pains at the same time Present illness For the last two and half years patient has had tabetic symptoms About the same time patient noticed that the left knee became weaker and could not bear any weight Had no pain whatever in the knee The joint became markedly swollen The weakness in the knee had increased *to such an extent that* patient was forced to use crutches during the last year Physical examination showed Argyll-Robertson's pupils and other signs of tabes The left knee (Figs 6 and 7) is enlarged outline of the joint is changed There is great deal of hypertrophic tuft ing A good deal of crepitus and loose bodies are evident Patella is mobile Under surface of patella is smooth No redness or tenderness of the joint. Measurements Circumference of the right

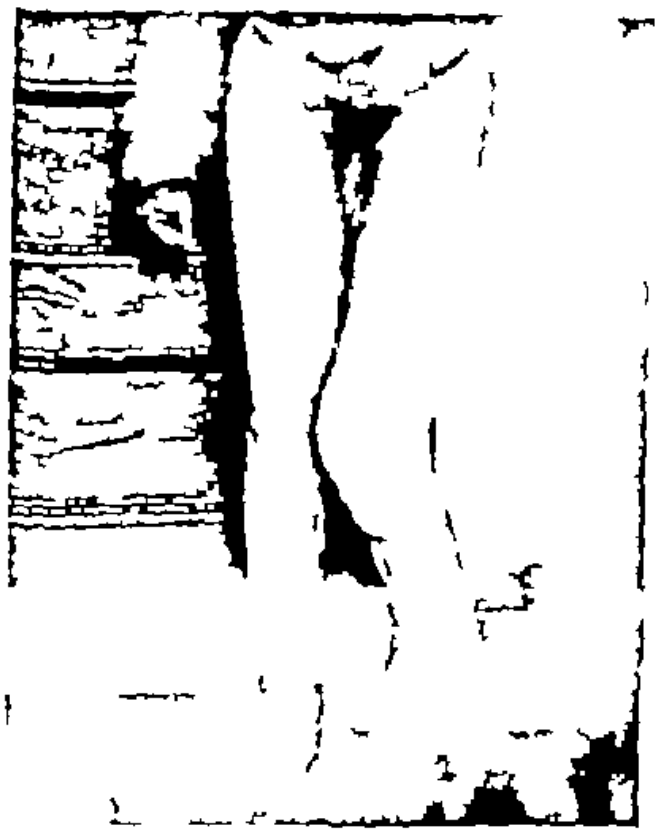


Fig Case 7 Showing the marked gross altera

knee at the middle of patella is 13½ inches while the *left* is 16 inches The circumference of the right calf at its greatest volume is 13½ inches while the left calf is 14 inches Motion of the joint Flexion of the knee is not limited The knee can be hyperextended to fifteen degrees beyond straight line Lateral motion is increased Abduction, fifteen degrees, and adduction, fifteen degrees to the side of the middle line Wassermann Test the *blood is negative while the cerebrospinal fluid gives* a strongly positive Wassermann, excess of globulin, excess of albumin *There are 5 cells to* the cmm in the cerebrospinal fluid The radiograph (Fig 8) shows the marked destruction of the bone together with the hypertrophic changes.

CASE 6 M S female aged 55 born in Russia, Hebrew Family history negative Personal history Had one miscarriage and no other children Does not know the cause of the death of her husband Present illness For the last four years patient has been complaining of marked *weakness in both feet No other complaint*

Physical examination showed many signs of tabes There is considerable emaciation of muscles of both legs Right knee Contour of the joint changed patella freely movable loose bodies in the joint Hyperextension and lateral motion in the knee is permitted Hyperextension to an angle of fifteen degrees Abduction also to an angle of fifteen degrees Left knee showed also presence of loose bodies the joint Hyperextension of the

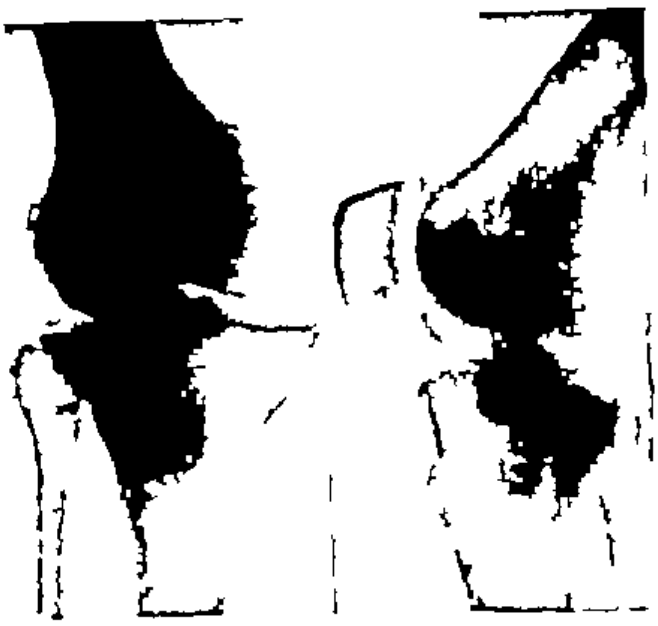


Fig 1 Fig.

Fig Case 7 Antero-posterior iew showing how the inner extremity is thickened producing the genu val gum.

Fig Case 7 The hypertrophy at the lower ex tremity of the femur patella, and the upper extremity of the tibia is apparent.



Fig 3. Case 8 Destruction of the body of the second cervical ertebra is seen at ( ) which ga the pressure symptoms.

knee t an angle of forty degrees. Abduction to an angle of twenty degrees Measurements Cir cumference of right leg below patella 1 inches left, inches Circumference of right thigh at three inches abov the lower border of patella ¼ inches while left is ¼ inches Right calf at its greatest circumference is 8½ inches left calf 9½ inches Both hip joints are lax. Wassermann, negat ve The radiographic findings (Fig 9) marked destruc tion of the bones together with hypertrophy

Case 7 J J male, widower ge seventy-seven, born in Germany Previous history Had gono rhoea and bubo at tw nty H does not know whether he has had chancre Has had tabes for the last t elve years For the last nine years has had marked weakness of left knee and a gradual production of knock-knee

Physical examination Has many signs of tabes with marked gen valgum of left knee (Fig) There is an excessive lateral motion f the knee per mitting o t ea h side The knee can be slightly overextended There are nice bodies palpable in the knee, especially under the patella Palpatio elicit some disorganization of the joint tiss es Marked varicose veins present on left leg The right knee presents only very slight ge algum otherwise t is normal The radiograph (Figs nd) shows th destruction and hypertrophy f the lower extremity of the femur t the inner t berosi ty The t bia and patella show also destruction.

Vertebral osteo-arthropathy Besides the knee involvement we have vertebral osteo-arthropathy S Fosdick Jones in an article "Vertebral Osteo-arthropathy gives a care ful review of the literature He found only thirty cases reported He adds two of his own This shows how this condition is often overlooked, as there were surely more than thirty two cases since 1874. He maintains that most observers have found that the vertebræ were compressed and reduced in height and enlarged laterally The inter vertebral discs were thickened and ossified The symptoms are usually those of pressure of the enlarged bone when pressure of the cord is produced.

Case 8 W G male, age 55, married born in Germany patient of the Montefiore Home Previ ous history Had chancre at the ge f twenty tw N secondary symptoms Present illness dates back t o years when patient began t com plain f inability to use freely his lower extremities and of paresthesia The upper extremities were also markedly weakened When admitted to the home, patient was bed-ridden Physical examination re vealed some ndefinite signs of tabes. Ma ked spasm of the muscles of neck so that patient was unable to rotat head laterally Flexion fair Could not extend the head back ard On support ing the chi and lifting up th head the spasm as

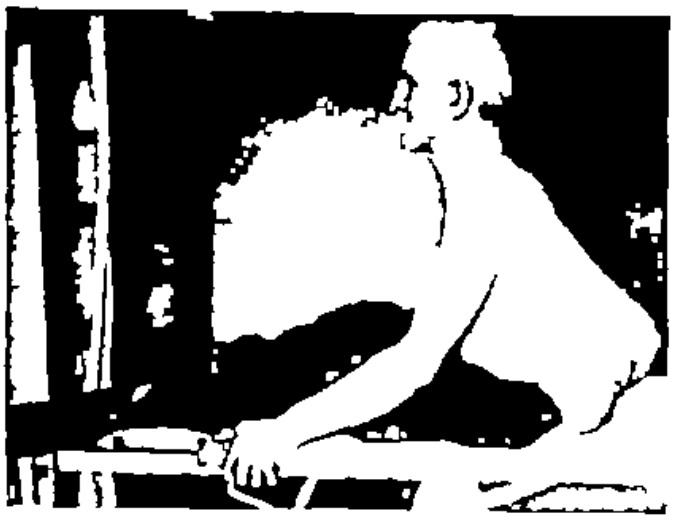


Fig 4 Case 9 Showing the marked angular kyphotic protrusion at the lumbar region

markedly diminished Patient had no pain th neck whatever Neurological status showed b sence of knee jerks abdom nal reflexes diminished Babinski present nkle clonus Sensatio pain and tactile normal delayed thermal sensa tion

The radiograph (Fig 3) showed the destruction of the body of the second cervical ertebra Wassermann as posit The diagnosis of ertebral osteo-arthropathy ith pressure on the cord as made The patient as put in plaster jacket with jury meet The paresthesias of the lo er extremities disappeared in one or t day Within three weeks patient as ble t walk Patient lived bout t years longer earing corset all the time. H finally died from chronic nephritis Unfortunately w were unable t obtai permission for an utop

Case 9 J F age 53 male born in Hungary H brew patient of Mount fiore Home Previous history Had gonorrhoea nd chancre at t enty five Has had tabes for the last eighteen years I 900 he noticed marked kyphosis of the lower spinal region had no pain or t nderness of the spine H was seen by Charcot who diagnosed t as ertebral osteo rthropathy Since 904 patient has been unable t alk and has been confined t bed Physical examination Patient has all the definit signs of t bes Wassermann negative Has marked hypotonia of all the muscles of the body At the sacrolumbar joint there is angula kyphotic protrusion present ith secondary lordosis t the left (Fig 14) No signs f flammation At one tim elling occurred over the Charcot kyphosis The swelling as increasing size but patient had no pain It only ga him some discomfort hen lying down. The fluid was aspirated and found t be degenerated leucocytes and plenty of débris but no bacteria

This patient was seen by Charcot personally in 1900 and was probably included in his reports



Fig 5 Case Ununited fracture of the neck of the femur Some new bone is thrown out

Many cases of spontaneous fracture occur in tabetics due to the spongy condition of the bones and this is frequently the first symptom observed This may be the first impetus to call the attention of the physician to examine the patient carefully and one finds that patient has Argyll Robertson s pupils, loss of knee jerks, etc H L Taylor in a recent paper reports nine cases of spontaneous fractures coming under his observation Crush fractures of the tibial tuberosities are especially liable to be followed by Charcot s joints.

Case D W male married age 53 Previous history Has had tabes for the last fourteen years Gives distinct history of syphilis While alking he slipped on the floor or as he expressed it, the knees gave nd patient broke the neck *and shaft of the left femur* (Fig 5) They never united although two years passed, and patient as confined t bed ever since

I am greatly indebted to Dr George R. Elliott, visiting orthopedist of the Montefiore Home and Hospital, for his kind assistance

to Dr S Wachsmann medical director of Montefiore Home for permission of reporting the cases, to Dr C Gottlieb and to Dr S Ehrenreich for taking the radiographs of the above reported cases.

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THE INGUINAL ROUTE OPERATION FOR FEMORAL HERNIA WITH A SUPPLEMENTARY NOTE ON COOPER'S LIGAMENT

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AND
LISTLE TUHOLSKE, M D S Louis
Instructor in Anatomy in St. Louis University

THREE recent contributions to the literature of femoral hernia by Moschcowitz (1) Lance (2) and Didier (3) render it unnecessary to review the subject from a bibliographic point of view There are certain fairly well rooted misconceptions regarding femoral hernia however that call for correction Among these false notions, the three most important are that the repair of a femoral hernia is an essentially simple operation that recurrence is a great rarity and that, as contrasted with the typical inguinal hernia operation the technique for femoral hernia does not require an anatomical exposure of the operative field The fallacy regarding the simplicity of repairing a femoral hernia is easily demonstrated by witnessing a hospital house surgeon thoroughly competent to do routine operative work, attacking his early series of femoral hernias if this does not furnish conclusive evidence one has only to tackle a femoral hernia of the variety with a small empty sac, surrounded by a large clump of preperitoneal fat in an obese subject or better still, a strangulated femoral hernia requiring intestinal resection and presenting the difficulty of pulling down sufficient healthy bowel to perform an anastomosis

The statement that femoral hernia does not tend to recur if only the sac is ligated and no attempt is made to close the femoral ring is not true In the case of inguinal hernia, three factors are supposed to safeguard against recurrence ( ) High ligation of the sac (2) snug closure of the internal ring with secure buttressing of the abdominal wall and (3) aseptic wound healing It is difficult to see why these same factors should not govern in the case of femoral hernia As a matter of record recurrences occur with astonishing frequency after femoral hernia operation Bressot (quoted by Lance) studied 395 femoral hernias and of this number 232 which were operated upon without closure of the femoral ring showed a 29 per cent recurrence, and 163 which were operated upon with the

From the Anatomical Department of St. Louis University

closure of the ring showed an 8.6 per cent recurrence. Moschcowitz (loc. cit.) reports an interesting case in which he had operated for femoral hernia and had secured a seemingly ideal result. About a year and a half later he was obliged to perform a laparotomy on the same patient. Examination from within the abdomen revealed a recurrence the sac being two inches deep. Pott (4) analyzed 422 cases of femoral hernia and found that there was 36.7 per cent of recurrences in those cases in which the femoral ring was not sutured, and 28.4 per cent of recurrences in those cases in which the ring was sutured. (The methods used for closing the ring were such that secure closure was impossible.)

The third fallacy, namely, that an anatomic exposure of the field is not essential in the performance of an operation for the cure of femoral hernia, serves as the chief point of attack of our contribution to the subject. We wish to show that such exposure is not only essential, but also that by considering and making it essential we at the same time render femoral herniotomy a much simpler operation and one much less likely to be followed by recurrence. Possibly the reason why anatomic exposure has not been considered necessary is that the vast majority of femoral hernias are repaired by the crural route, and when a femoral hernia is attacked through a thigh incision it is physically impossible to secure an anatomic exposure. This statement is beyond all doubt or question and may be proved easily by anyone who will take the time to dissect the region of the femoral ring and canal.

It is an unfortunate fact that practically all the illustrations of the anatomy of the femoral ring in practically all the standard text and handbooks of anatomy and surgery are so made that the average individual cannot orient himself properly in regard to the structures pictured. It is equally unfortunate that probably the most important structure utilized in the closure of the femoral ring, namely, Cooper's ligament, is not only not pictured in any of the anatomies, but also is not adequately described in most of them. For these reasons we have dissected a female pelvis and have had it drawn accurately to scale to show the exact anatomic relationships at the femoral ring.

Figure 1 is a representation of a female pelvis tilted slightly downwards and viewed from the front and slightly from the right side (left side of the observer). The abdominal muscles have been cut away, the external oblique aponeurosis has been trimmed off just above its reflection, and the transversalis fascia has been cut away just above the point where it begins to line the pelvis. This illustration shows the femoral ring, occupied by a loop of ileum and bounded by the following structures: Externally by the external iliac vein, anteriorly by the Poupart's ligament, internally by Gimbernat's ligament (which is covered by a reflection of the transversalis fascia and which, therefore, is not lettered in the illustrations), and posteriorly by Cooper's ligament, investing the iliopectineal line of the os pubis. (The deep epigastric artery, which shows in our other illustrations, is concealed by the loop of ileum.)

A properly performed operation for the cure of femoral hernia by the inguinal route renders it possible to outline the structures in and about the femoral ring as clearly as they are pictured in our illustration, difficulty being encountered only in very obese subjects. The incision is the usual one for the repair of inguinal hernia, modified only in so far as its lower end approaches the pubic region more closely than does the ordinary inguinal hernia incision. The incision should be from three to four inches in length and, if necessary, may be continued downward onto the thigh, as is described later under "step 4."

The second step in the operation consists in dividing the aponeurosis of the external oblique in the direction of its fibers.

The third step is illustrated by Fig. 2. By raising up the upper flap of the external oblique aponeurosis, the conjoined internal oblique and transversalis are brought into view. A retractor is slipped under these muscles and used to retract them upward. Another retractor is slipped under the lower flap of the external oblique aponeurosis, which is retracted downward, bringing Poupart's ligament into full view. A bridle of tape or gauze is now passed under the round ligament



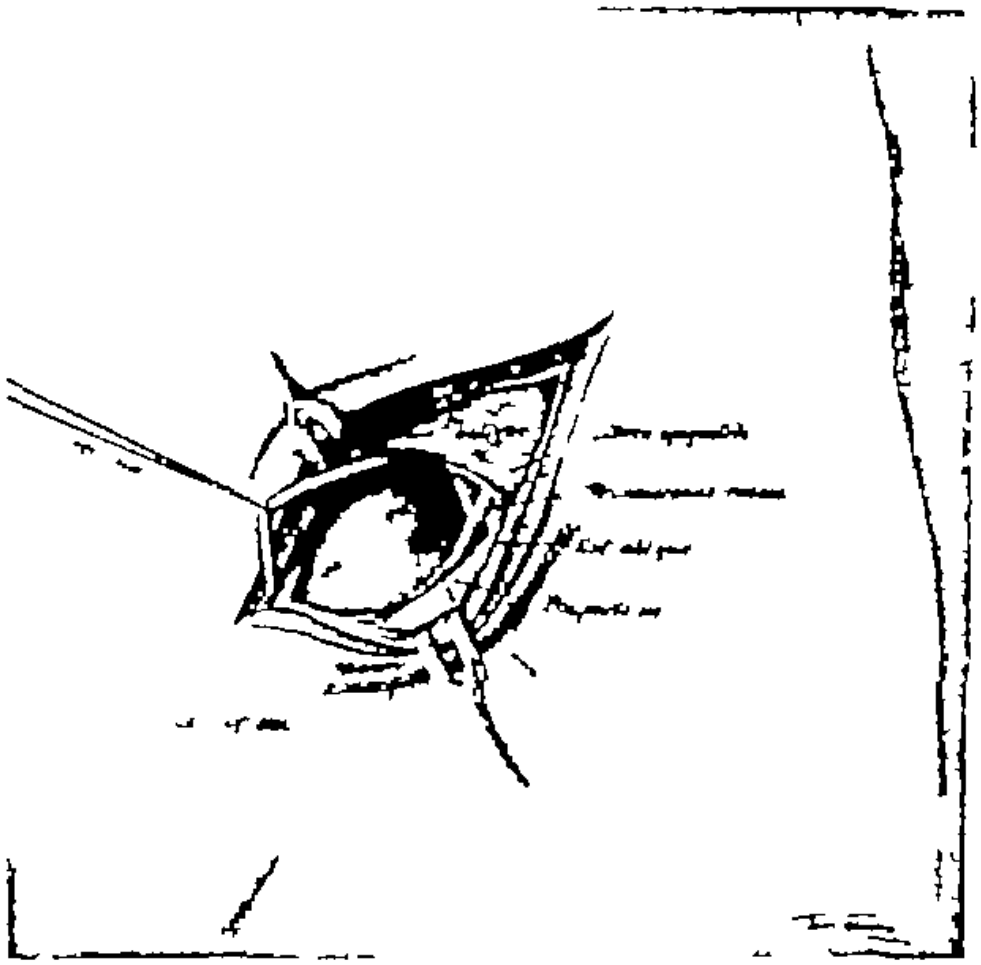


Fig. Skin, subcutaneous tissue, external oblique and transversalis fascia have been incised and the upper and lower flaps retracted upward and downward respectively

The fourth step consists in opening the peritoneum just as it converges to form the neck of the sac. Through this opening the hernial contents are pulled out of the sac, replaced in the peritoneal cavity and held there by a gauze pack if necessary. If the intestine or omentum is strangulated it may be liberated with ease by cutting Gimbernat's ligament, which forms the sharp inner margin of the constricting ring. Gimbernat ligament is in full view thus rendering it impossible to encounter uncontrollable hemorrhage from an anomalous obturator artery. When one operates from the thigh and is obliged to cut Gimbernat's ligament blindly with a blunt pointed bistoury one can never be sure that he will not encounter the so-called *corona mortis* (crown of death) formed by the anomalous obturator. If the hernial contents are adherent to the sac, one of two things happens: (1) Either the sac is *not* adherent to the tissues of the thigh (and it is almost the invariable rule that it is *not* adherent) in which case traction on the hernial contents pulls the entire sac out of its bed converting the femoral into an inguinal hernia and thus enabling the operator to deal conveniently with the adhesions between sac and sac contents, or (2) the sac is adherent to its bed, in which case the inguinal incision is extended downward on the thigh over the hernial protrusion, thus enabling the operator to dissect the sac free from its adhesions to fascia and cellular tissue.

Let us assume that we are dealing with a typical case. The fourth step has been completed, the hernial contents have been extracted from the sac and reduced into the abdominal cavity and we are ready for the

Fifth step which consists in introducing a

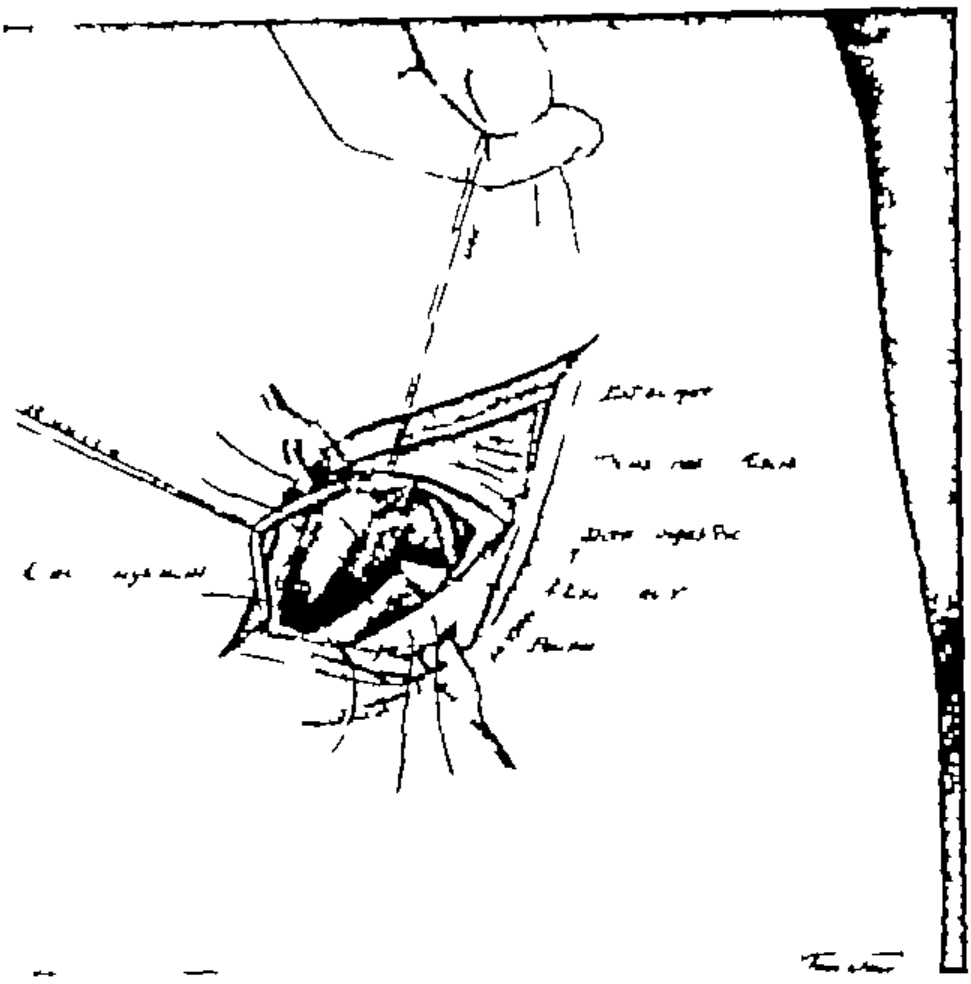


Fig 3 The sac has been delivered ligated high and amputated The three chromic gut sutures for closing the femoral ring are in place, ready to tie

dressing forceps into the sac, down to its low est point, then closing the forceps and withdrawing it This procedure everts the sac and con erts the femoral into an inguinal hernia The sa is now tied off by transfixion ligature or by suture and, as may be seen in Fig 3 it is tied off with ease sufficiently high to guarantee absolutely against leaving a dimple protrusion or any other variety of poten tial hernia behind If the sac does not evert easily we know that it is adherent to the bed in which it lies, and we must proceed to dissect it out by retracting the lower skin flap or by enlarging the incision as described above under the head of fourth step

The sixth step consists in closure of the femoral ring The ring is exposed to full view by retracting the lower flap of the external oblique downward and outward and by retracting the skin the upper flap of external oblique, the tendon of internal oblique and transversalis muscles and the transversalis fascia upward and inward (Fig 3) The ring is bounded by the external iliac vein externally by Poupart s ligament anteriorly by Gimbernat s ligament (covered by a reflection from the transversalis fascia) internally and by Cooper s ligament posteriorly A detailed description of Cooper s ligament is furnished in the supplementary note at the end of our paper It is sufficient to point out here that when the parts are retracted as we have described one can palpate the horizontal ramus of the pubis and can see it covered by a dense tough white glistening fascial membrane. This membrane is Cooper s ligament With a small full curved needle one takes a deep bite through Cooper's ligament (deep enough to go down to the periosteum of the pubic bone) just internal to the

iliac vein and then another bite through the lower flap of the transversalis fascia and the edge of the Poupart s ligament Another suture is similarly placed internal to the first one and a third one still further internally if necessary (Fig 3) The most internal suture always picks up Gimbernat s ligament. When these sutures (we use chromic gut) are tied, they approximate Poupart s to Cooper's ligament and effectually close the hernial orifice In placing the first suture the external iliac vein is protected against possible puncture with a small curved retractor

The seventh and last step resembles the ordinary closure of an inguinal hernia. Chromic gut sutures approximate the internal oblique and transversalis muscles (including the upper flap of the divided transversalis fascia) to Poupart s ligament. We usually do not transplant the cord or round ligament. Finally the external oblique is sutured and then the skin incision is closed.

The operation as we have described it and as we execute it is practically indentical with the description furnished by Moschcowitz (loc. cit.) As the result of our experience we feel that Moschcowitz s enthusiastic recommendation of the operation is more than warranted and that as regards rationality simplicity and safety this operation stands in the same relationship to femoral hernia that the Bassini operation does to inguinal hernia. In strangulated femoral hernia requiring intestinal resection the inguinal approach renders resection and anastomosis a comparatively easy procedure. There is never any need to consider even for a moment the supplementary abdominal incision, which is recommended by so many authors as a routine step in femoral hernia when resection is indicated.

SUPPLEMENTARY NOTE ON COOPER S LIGAMENT

The inguinal attack on the femoral hernia has not come into more general use, largely because the various authors who have recommended the method ha e invariably emphasized the importance of Cooper s ligament, without devoting even so much as a line to its description In closing the femoral ring, one is confronted with the necessity of suturing Poupart s ligament to Cooper's ligament and one is very apt not to know what Cooper's ligament is. If one attempts to inform himself in the usual way he finds that in Quain s *Anatomy (first edition)* the subject is not mentioned in Cunningham s Anatomy (third edition) likewise no mention is made of the structure in Morris Anatomy (edition of 1907) the ligament is not described, and in Gray s Anatomy (edition of 1905) it is described most briefly in one place as "a strong ligamentous band etc. (page 437) and in another place as a small reflection from the tendon of the transversalis" (page 448) The average surgeon, in his own library is not equipped to furnish himself with adequate information concerning Cooper s ligament. Indeed, one of the results of our investigation has been the discovery that even the anatomists are not in agreement

In 1804 Astley Cooper published at London, his classical work on Anatomy and Surgical Treatment of Abdominal Hernia In 1827 a second edition was edited by C. Aston Key Copies of either of these editions are difficult to procure Fortunately however in 1844, an American edition was put out by Lea and Blanchard at Philadelphia. This American edition is a verbatim copy of the second London edition as regards text. In this work on hernia, Astley Cooper for the first time described the ligament which now goes by his name

A surprising and almost ludicrous phase of the subject is that one really cannot find Cooper's ligament in Cooper s own book, unless one has discovered in advance what the ligament is By consulting the larger French and German handbooks or systems of anatomy one finds that the ligamentum cooperi is, in reality the ligamentum pubicum, and then if one goes through Cooper s work again he finds that on page 3 (American edition, loc cit) Cooper describes the os pubis as being "covered by a ligamentous expansion which forms a remarkably strong production above the linea iliopectinea, extending from the tuberosity of the pubis outward, and pro-

Moschcowitz very modestly lays no emphasis on claim to having devised the operation but his clear description should do much toward popularizing the inguinal attack on femoral hernia

jecting from the bone over that line. Later he refers to this ligament as the ligament of the pubes, thus establishing the identity of this structure with the ligamentum pubicum. Of course, Cooper never utilized this ligament for closing a hernial ring for in the days of Cooper hernial rings were not closed.

Cooper's own description as we see is not adequate, and it is necessary therefore, to supplement it with the more detailed investigations of modern anatomists. The three best descriptions that I have been able to find are those by Poirier and Charpy, Testut, and by Eisler (in Bardeleben's Handbuch).

Testut (5) says: The superior border of the pectineal crest is covered by a sort of fibrous cord, very thick, very dense, very resistant, intimately adherent to the bone, and extending from the spine of the pubes to the iliopectineal eminence. This is the pubic ligament of Cooper or more simply termed, Cooper's ligament. The morphological significance of this fibrous structure lying on the sharp bony angle of the pectineal crest, does not appear to be clearly understood. Various authors describe the ligament of Cooper as a fusion, at the same point, of various fascial layers: pectineal aponeurosis, Gimbernat's ligament, Colles ligament and the fascia transversalis, all of which find insertion into the pectineal crest. But the ligament of Cooper does not consist of these fasciæ alone for it is made up also of other structures, of which the principal ones come from the lateral margin of the adminiculum of the linea alba.

Poirier and Charpy (6) furnish the following description of the ligament: The iliopectineal line of the pubis marks the point of fusion of various fascial layers: the pectineal fascia, Gimbernat's ligament, behind this the posterior pillar of the external ring, and finally, the transversalis fascia, re-enforced by the ligaments of Henle and Hesselbach. Thus the angular bony edge overladen by all these insertions is transformed into a rounded cord which is given the name of the pubic ligament of Cooper — Cooper's ligament.

Finally Eisler in Bardeleben's (7) extensive Handbook of Anatomy describes Cooper's ligament as follows: The fascia of the pectineus muscle (which covers the muscle as a thin fascial aponeurosis) changes at this point (i.e. the crest of the pubic ramus) into a strong flat tendinous cord which runs parallel to the horizontal ramus of the pubic bone, finally reaches the ramus and projects over it. This cord the so-called ligamentum pubicum (Cooperi) passes laterally and dorsally over the iliopectineal eminence and ends on the ilium. Medially it extends over the mesial end of the horizontal ramus of the pubis onto the superior surface of the body of the pubis. All of the structures previously mentioned furnish fibers to the ligamentum pubicum — (these structures are: tractus iliopubicus, falx inguinalis, ligamentum Collesi, ligamentum interfoveolare, interfoveolaris muscle and the common aponeurosis of the obliquus internus and transversus) and in addition to these there are fascicles from the adminiculum lineæ albæ, sometimes fibers from the tendon of the psoas minor and regularly on the deep surface, fibers from the origin of the pectineus. As a matter of fact, we may assume, with safety, that Cooper's ligament is developed essentially from the pectineal fascia as a result of the varying pull of the different fibrous strands that radiate into it. Moreover Cooper's ligament forms only that part of the pectineal fascia which is especially taxed by the above-mentioned pull.

It is evident from the above three translations that even the authorities on anatomy are not in complete agreement. The descriptions enable us, however, to orient ourselves very clearly regarding the gross anatomic relationships of Cooper's ligament. The important feature from the surgical point of view is merely this: When the ramus of the pubes is exposed by an inguinal incision, it is seen to be covered by a thick fascial bundle. This fascial bundle is Cooper's ligament.

Cooper, stating quite naively that some surgical writers have actually proposed tying off the hernial sac, but that such an operation "not only endangers, but also dangerous does," the inflammatory processes set up by the ligature. He quotes instances of death from suppurative peritonitis caused by ligating the neck of the sac.

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between anterior crural and gluteal nerves and none are cut, nor aught else but connective tissue unless it be a small artery The capsule over the displaced head is found lying just beneath the muscles mentioned It is incised freely in the line with the incision already made The hip is now flexed which relaxes the capsule, and the gloved finger is inserted and passed into the capsule toward the acetabulum to the narrow part. A long bladed straight probe-pointed bistoury is guided by the finger *through the narrow place* into the acetabulum. By pushing on the back of the blade with the finger inside the capsule and making a to-and-fro motion with the holding hand on the outside the capsule is cut downward through its lower part so that the finger can slip along the knife into the acetabulum This downward direction must be taken to avoid the femoral artery and vein An ample opening of the acetabulum must be assured Then, with the hip still flexed guide and lift the femoral head over the rim into the cavity At once extend the thigh abduct it 70 to 75 degrees and rotate it inward 90 degrees—then flex the knee. This makes the long head of the rectus tight, and it lies just over the femoral neck in its new position and prevents anterior relaxation, and at the same time gives the plaster of Paris splint a much more efficient control of the femur but it does put the limb in an awkward position I formerly used to suture the capsule. Now I do not the capsule at the outer side of the incision is carried downward and inward by the neck as it moves with the head into the acetabulum, and passes beneath the inner part of the same The patent incision is an excellent drainage for the joint cavity and when healing has occurred the reduplicated capsule is strengthened by the act *The opening in the fascia* lata I suture with catgut and the skin with horsehair The limb remains in the original plaster of Paris splint, which is a double spica, four or six weeks Radiograms check up the accuracy of the reposition

At the end of the four or six weeks the plaster is removed. Now if there is a twisting of the femoral shaft turning the head forward, I drive while the limb is still held in



Fig 3 Radiogram of replaced hip, the head in the acetabulum, the nail holding the head and neck in transverse plane, the line of the osteotomy of the shaft and the whole held by the plaster of Paris spica.

inrotation, a long nail into the femur between the trochanters Then I do a subcutaneous osteotomy just below the nail Next, holding the upper fragment in the proper position by means of the protruding end of the nail, so that the head is in the acetabulum and the trochanter is in the normal transverse plane, I rotate the lower fragment out so that the toes point a little (15 to 20 degrees) outward Then another double spica of plaster of Paris is put on and in this the end of the nail is buried so that *the inward rotation* of the upper fragment is maintained (Fig 3) The reposition and osteotomy and the position of the fragments are again checked up by a radiogram The nail remains *in situ* four to six weeks The spica is undisturbed until the femur has healed and is firm Splints, spicas of plaster of Paris are put on at intervals for eight to twelve months each succeeding one being little shorter and

with each the limb being put in less abduction Walking begins in the splint about two and a half to three months after the osteotomy

With this plan I *know* I have put the femoral head *into* the socket of the acetabulum and not on it with the capsule interposed A proper intimate contact of femoral and acetabular cartilages is secured This for the first stage, which overcomes the obstacles of the capsule. The second stage puts the femoral head and neck into a proper relation both with the femoral shaft and the acetabulum so that when the foot is in the correct anteroposterior plane the vertical plane of the neck and head is directed inward and a little forward and the head enters the acetabulum properly so that the posterior side of the neck is not in contact with the posterior lip of the acetabulum This lessens the likelihood of reluxation and if the patient has but a practical head and neck and a competent acetabulum reposition will be stable and function will be satisfactory

The evolution of the plan is simple. The stiff hips following the earlier operations in which the acetabulum was deepened led me to try the manipulative method. The instability of reduction in one instance made me, immediately after the manipulative reduction incise to find out what was the difficulty I found bunched up capsule between the head and acetabulum. When this was cleared away and the head really entered the socket reposition became stable Next I noticed—in cases thus treated—reluxations after a few months or years and referring this to the known distortion of the shaft, I adopted the practice of the osteotomy

There is another danger which has been avoided by this particular technique though its imminence was not appreciated until very recently

I had noticed an interference with growth following the deepening of the acetabulum in the case of a young woman upon whom I had done the original Lorenz operation when she was a little child. This operation as you remember deepened the shallow acetabulum The reposition done on the child was stable but she had a progressively increasing shortening of the limb during her years of growth. A radiogram taken when growth had been obtained shows the acetabulum at too high a level on the side of the pelvis, just as the acetabulum comes to be too highly located in the cases of hip-joint tuberculosis with involvement of the acetabulum and destruction of the epiphyseal line of the iliac component. Evidently the excavation and deepening of the acetabulum in the old type of operation interfered with epiphyseal lines and checked the normal downward growth of the iliac component of the socket.

With this technique of reduction through an incision which really reduces and osteotomy when it is necessary to fit the component parts of the joint to each other I feel I can give my patients a full 100 per cent of their chances for a practical joint. I cannot recreate bony deficiencies nor perfectly fit together wholly mismatched parts, but with a practical acetabulum and a practical head and neck I think the method should give a practically normal joint. A joint is a mechanical contrivance and the test of its mechanical competence is its functional competence. A joint which has a functional competence equal to that of a normal joint is itself a normal joint. In many instances the radiogram may show variations in shape size and other details from the generally accepted form, but if the function is equal to that of a normal joint I claim that it is a normal joint.

As regards statistics There have been twenty-nine hips reduced by incision with no osteotomy following Of these, eight have gone into the position called anterior transposition. Three have stable reposition but have developed coxa vara. One has with no demonstrable infection become completely ankylosed. In one an infection of the incision caused death Four we do not know about. Twelve have functionally normal joints

This is 41 3 per cent of success.

There have been twenty-seven hips reduced by incision with an osteotomy following to correct a twisted femoral shaft. Of these two have gone into anterior transposition because of incompetent acetabula In two the nail failed to hold the upper

fragment after the osteotomy and the parts returned to their original relations. These cases were then as if no osteotomy had been done. In one instance I must have encountered some osseous dystrophy for the femur crumpled up in a simple and forceless manipulation and though the reposition is stable the alignment of the shaft is erratic, and will need correction later. Three are still under treatment. Nineteen have functionally normal joints.

This is 70.3 per cent of success.

TUMORS OF LARGE NERVES ASSOCIATED WITH FIBROMA MOLLUSCUM WITH EXHIBITION OF LARGEST SPECIMEN ON RECORD

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THE writer's interest in the subject is largely due to the enthusiasm of Dr. Carl H. von Klein who was kind enough to furnish him with a complete bibliography of the subject, and this fact seems sufficient reason to make the paper of sufficient value to present to this society.

There is so much literature on the subject that only a few salient points will be dwelt upon in the paper and anyone who may be interested further can refer to the bibliography.

The first well described morbid condition of neuroma was written by Paul Aronson in his work entitled Pathologie des tumeurs in 1788 where he relates his observations and describes tumors composed of nerve fiber. F. V. Alexander in a dissertation in 1800, speaks of such tumors developing either in the neurilme or in the nerve. These tumors were known under the name of nodular nerve tumors, tubercular nerve tumors, scirrhous nerve tumors, ganglion tumors, elephantiasis, and so forth.

Odier of Geneva in his work entitled Manual de Médécin Pratique 1803 first introduced the term neuroma and describes a case of a species of aneurism of the radial nerve and says all the nerve fibers spread fan-like from one another or like the ribs of a melon their center is filled with a whitish matter and in some places yellowish it is spread out in intervals of an infinite number of transparent vessel interlaced with one another. This description says the great pathologist Virchow evidently refers to a case of myxoma. He further says that every tumor has an organic a morbid or a normal structure this defect can exist in the neurilemma in the marrow of the nerve in the arteries in the veins or lymphatics of the sheath or finally in the nerve substance itself. This essential point has induced Odier to term it neuroma. He also used the term neuroma for morbid tumors circumscribed and deep which are caused by accidental swelling of a nerve and at the extreme stage of which the tumor causes very severe pains.

In Hyde eighth edition Diseases of the Skin which I understand was written by the late Dr. H. G. Anthony fibroma molluscum is stated to be a developmental defect manifesting itself by the presence of tumors of the skin and other organs of the body pigmentations of the skin and mucous membrane of the mouth and by defect in the mental development one or both of the last two named symptoms may be absent.

Symptoms. The tumors are usually numerous and scattered irregularly over the entire body. They are from pea to egg sized and vary greatly according to their age and dimensions. In early development they present dome-shaped pea to bean sized elevations which are softish semi-solid or pasty with normal epidermal covering. Later they are pear-shaped semi-solid formations sometimes capped by an opaque summit.

Complete bibliography may be obtained by writing to the author.



which present the appearance of a vesicle and which bleeds freely when pricked Digital compression causes these tumors to disappear through a ring in the skin and when released they spring back into their normal position Old tumors are less gelatinous are firmer mammillated often pedunculated Small sized tumors may recede leaving an empty pouch of skin When egg sized the tumor are usually subcutaneous and are less lobulated than fatty tumors when diffuse especially in the face they draw the skin into extensive folds—fibroma pendulum

Occurring about the anus they present folds of tissue which resemble labia minora vulvæ and which annoy the patient in defecation They are not painful when touched and they produce no subjective symptoms In a given case tumors of all sizes and in all stages of development may be present When very large there may be a single tumor present which may be more or less pedunculated The tumor may affect the mucous membrane of the mouth large nerve trunks suprarenal capsule intestines and other internal organs Patches of leucoderma telangiectasia patulous orifices of sebaceous glands comedones and fatty tumors are not uncommon Pigmentations are usually light to dark brown colored freckles sprinkled over the entire cutaneous surface together with two large patches of pigmentation just black points of pigmentation are sometimes observable on the large areas The freckles may be discernible in the negro

Riecke enumerates about ten conditions which seem to influence the congenital factor by increasing the lesion (1) trauma (2) extremes of cold (3) chronic irritation of the skin



(4) physical influences (5) overwork (6) puberty (7) pregnancy (8) menopause (9) infectious diseases The large number of contributary influences given by this last named author seems to be an index of the lack of real knowledge of the etiology of this disease and the pathology as yet described is not very clear however Soldan gives the following conclusions

First The pigmented nævi are in the majority of cases the first symptoms of a fibromatous process in the connective tissues of the cutaneous nerves

Second The pigmentation is probably a result of the fibromatosis of the nerve connective tissue

Third The nævus cell nests and strands, as described amongst others by Unna, are neither epitheliomata nor lymphangiofibromata but neurofibromata

Fourth From the fibromatous process of the pigmented nævi develop dermoid tumors which are described as soft fibromata and elephantiasis molli



Fifth The fibromatous process is not only confined upon the skin but may also appear on any place of the peripheral nerve system and may also lead to the formation of so-called pseudoneuromata and plexiform neuromata.

Sixth The variety of forms of neurofibromatosis is caused by localization anatomical conditions and energy of growth of the elements of the tumors.

We have to differentiate therefore

1 Neurofibromata of the larger nerve trunks, as far as they still show a distinct perineurium

To these belong

(*a*) Pseudoneuromata (fibroneuromata) characterized by the localized proliferation on single points of the nerve

(*b*) Neuromata plexiformia The proliferation attacks larger areas of the nerves equally

2 Neurofibromata of the nerve end distributions after loss of the perineurium

(*a*) Cell nests and strands of the nævi pigmentosi verrucæ carneæ or molli fibromata molluscæ characterized by circumscribed proliferations in the skin

(*b*) Elephantiasis congenita neuromatodes pachydermatocele elephantiasis molli diffuse proliferation in the area of the distribution district of one or several larger nerve trunks of the skin

Francini says In the nerve fiber and at any portion of their course the regression of the segmental elements of which they consist may take place for reasons hitherto unknown by extensive proliferation then give rise to the formation of tumors which in their construction reproduce distinctly the different stages through which the segmental cell passes to its complete differentiation

As this is the case with other tissues there also exist here a very distinctly perceptible parallelism between the various neoplastic forms and the structural changes which may occur under other conditions of the increased activity in the nerve tissue This conformity of facts can be easier studied between the true neoplasm and the amputation neuroma which latter though not of purely neoplastic nature must from its histologic standpoint be counted among the myeloid neuromata because the picture that we obtain from them is in the most minute details equal to that which certain tumors that develop in the continuity of a nerve trunk may show

The genuine tumors, supposing even the possibility that new formations of connectival origin may occur in the nerves show the greatest variety of histologic symptoms, so that one is forced to presume the segmental nature of the same

This perception is easier in tumors whose tissues correspond with earlier forms than those of the grown and normal nerve fibers

A thorough examination may however in forms with absolutely embryonal characters and in those in which metamorphoses of various types develop reveal the development of the new formation tissue from the nerve fibers which are in an extreme stage of cell regression

The knowledge of the diffuse congenital, and hereditary neuromata is more in conformity with the conception of the neuroplastic nature of these tumors than with the conception of a connectival origin, and on the other hand the localization of the changes upon few nerve bundles, whilst the others continue their way upon the periphery of the tumor may make the study of this connection of the new formation with the connective tissue difficult

The study of nerve tumors when performed systematically and leaning upon the knowledge which anatomy embryology and the experimental pathology of the peripheral nerve system have given to us, whilst it permits us to perceive all the deviations from the normal evolution which may occur in a nervous tissue form a tract which is worth while to be intimately followed and which may give us important result concerning the origin of the nerve fiber and its inner structure

Von Recklinghausen in 882 gave such a good description of this disease that it bears his name

From the local profession in Chicago we were given very interesting report by Drs R B Preble L Hekton and William Healy which show what a great variety of morbid conditions may accompany this disease

There are four general divisions in the

symptomatology" tumors of the skin, tumors of the nerves pigmentations of the skin and functional disturbances, which have been emphasized by Dr Preble in his discussion of his remarkable case.

The writer's case is of interest because of the large size of the tumor which was removed from the left sciatic nerve January 29 1912 at the Chicago Policlinic Hospital.

The following is the history

E. Z age 3 female, single, saleslady, previous health good Family history negative so far as this disease is concerned. About seven years ago she was struck the back of the lower third of left thigh by some one knee while at a dance. No attention was paid to this until about a week later, when a swelling was noticed which grew slowly until at present it appears to be the size of a cocoanut, has a solid consistence slightly movable in all directions when the posterior muscles of the thigh are relaxed, but fixed when they are held tense. There is no particular enlargement of the superficial veins and no disturbance of nerve function except during the last four days, during which she has experienced a moderate amount of pain in the growth Upon cutting down upon the growth it was found to involve the sciatic nerve and measured six inches in length by three in diameter and weighed one pound and three ounces Dr John A Graham of the Policlinic Laboratory reported the tumor to be a fibroma.

In reviewing the literature, the writer found that several authors dwelt on the fact that the new growth of nerves is apt to displace the nerve fibers outward so that they may surround the growth or the growth may be, as it were, forced through one side, but in this case it was noticed that several fusiform enlargements about three-fourths of an inch long and one-quarter of an inch in diameter appeared on nerve bundles extending downward into the middle of the nerve trunk so that it was impossible to remove the growth without destroying nearly if not all the nerve fibers of this very important nerve trunk. The time since the operation has been too short for evidences of regeneration to show themselves on account of the great length of nerve trunk which was removed

The photographs herewith presented were very kindly taken by Dr D C. Hoyt, and Dr James C. Gill was also kind enough to examine the case for me twice since the operation with reference to its neurological findings.

CYSTS OF THE OMENTUM[1]

With Report of a Case

By V. A. FUNK, A. B., M. D., Vancouver, Wash.

THE more frequently a pathological rarity is encountered the more it is circulated through our current literature of to-day and the more thoroughly it is discussed before our gatherings which is the only way in which the whole profession can expect to familiarize ourselves with the condition, while the different phases of the subject are slowly thrashed out, until a more or less settled idea of the same becomes general. Such has been the career of each pathological finding as it has presented itself before the scientific men of our profession and while many obscure conditions have been brought out of the darkness we know too well that too many are still far from being on a perfect understanding basis. In the latter class we must place the cysts of the omentum.

When we consider that only thirty-eight cases of cysts of this tissue have up to the present time been placed on record, we can easily understand how very rare the condition is, and we are not surprised when we search some of our journals from their first publication to the latest issue without finding a single article upon the subject. Some of the cases reported are so indefinite that very few conclusions can be derived from them. The condition was first described in 1851 by Gairdeur.

Cysts of the omentum are exceedingly interesting from two standpoints. First, we will consider the origin and pathology, which may be termed the scientific side. From the cases reported they have been classified as follows: Embryonal, which is advanced mostly from the fact that these cysts usually occur in childhood, fifty per cent occurring before the age of ten and sixty-five per cent occurring before twenty-one. Hearns[2] reports a case of a boy, eight years old, who had a fluctuating tumor at birth which decreased in size for a while, but again enlarged and was aspirated at the age of four years. Upon refilling an omental cyst was removed four years later. Nearly all observers believe some of the cysts to be embryonal in origin, claiming we can have embryonal rests here as well as in any other part of the body. The echinococcic origin has never been proven in the pathological laboratory. Lymphatic, originating from either the vessels or nodes, has held much favor. Rokitansky ventured to make the assertion that all omental cysts were of this origin, terming them as either dilated lymphatic vessels or dilated lymph nodes. Hemorrhagic origin for four of the above cases contained coagulated blood and eighteen contained a dark fluid which from all appearances was partially blood at some time. Dowd reports a case of a man aged twenty-six with an omental cyst with a pedicle made up of twisted omentum, the origin of which he thought was as follows: Hemorrhage from some cause into the omentum forming a hematoma. Absorption of the hemoglobin and degeneration of the blood cells, followed by torsion with oedema and transudation of the watery elements of the serum into the cyst cavity. First case of a boy two and one-half years old contained dark, bloody fluid. The case which I will report later I am inclined to believe had its origin from an embryonal rest, because it had a definite capsule and the fluid was negative and as perfectly clear as spring water.

The pathology varies greatly in the different reports. The contents have been lymph, chyle, serum with and without the presence of blood cells, dark fluid containing coagulated blood and clear watery fluid. Very few have contained a definite capsule, most of them separating the folds of the omentum with no further encapsulation whatever. They have also been reported as being outside the

[1] Read by ... Clinical Surgery
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omentum and attached by thin adhesive band which fact led Phillips to suggest that these might have had their origin from the ovary and by twisting of the pedicle were detached and continued their existence by receiving nourishment from the omentum When the cyst has a definite wall it is held to the omentum which usually forms a second or outer wall by slight adhesions and is nourished by vessels running directly from the omentum When the cyst becomes extremely large adhesions will be formed between the omentum and parietal peritoneum due to the pressure Two dermoid cysts have been reported by Waldy and Weil

The most interesting part of the subject is from the practical standpoint which includes both the diagnosis and treatment. The fact that only two cases out of the above number were diagnosed before operation emphasizes the weakness of our diagnostic ability in these conditions I can hold three points as of paramount importance in the diagnosis of omentum cysts superficial location almost normal passive mobility with the downward movement limited and absence of functional disturbance These points would all be useful before the growth had reached any great size for when the abdomen has become completely filled with the tumor and is adherent to the abdominal wall as in the case I am reporting the location is not diagnostic there is no mobility whatever and we usually have dyspnea palpitation indigestion and constipation due to the pressure

When the cyst is not large the location at the umbilical region and above the intestines with free motion in each lateral direction and upward but only to limited degree downward not disturbed by the respiration not causing the patient any disturbance whatever the general health being perfect and the tumor slowly getting larger would be very suggestive for mental cyst and I think a diagnosis could be made from the above picture if seen at the proper time

Several deserve hitherto reported upon which relatively to mention the huge vomiting and diarrhea alternating with constipation and cachexia have been noted in extreme cases Palpation reveals a movable fluctuating growth which is pathognomonic of cystic growth of the abdomen the only exception being a lipoma which sometimes fluctuates. Pancreatic tumors while having their location in the umbilical region usually occur later in life and give constant pain and if malignant produce fatty stool and icterus. Mesenteric cysts usually have a coil of intestines between the tumor and the abdominal wall with a lessened area of mobility This condition has been confused with ascites lipoma aortic aneurism cysts of the liver pancreas urachus and tubercular peritonitis.

The treatment may be summed up in a single word — removal Tapping which is always a very dangerous procedure when dealing with abdominal condition will only relieve and the cyst is sure to refill Hearn tapped his case but was compelled to operate later Hart aspirated not for a palliative remedy but because he was afraid to release the great hydrostatic pressure from the splanchnic vessels suddenly so he removed about five pints of the fluid and operated five days later Matthews cites a case of a boy eight years of age who was tapped four times with a rattling each time and the condition of the patient becoming worse The puncture through the cyst wall may remain patent and permit fistulous flow from the leakage If the cyst has a definite capsule it can be freed from its adhesions and removed *in toto* Should there be no cyst wall except the omentum itself that portion forming the cyst can be removed If there is a pedicle formed either from an adhesion or a twisting of the omentum this can be tied off and the tumor removed With *recovery of 86 per cent of the* cases reported we need not fear the radical operation as it is the only means of a cure These cysts confront the surgeon who does not expect them and a very great mistake indeed might be the outcome in the hands of an inexperienced operator

good with the exception of pneumonia, which kept her in bed two weeks. This occurred three years ago following which she first noticed a slight enlargement of the abdomen. The abdomen has slowly grown larger since that time From the beginning of the growth which they thought was never localized, but general she had no symptoms whatever until the summer of 9 8, when she was confined to bed two weeks with severe pains in both inguinal regions, radiating to the back only The pain was most severe on the right side. She had two or three chills followed by fever none that she knew of at any other time during her trouble. After getting out of bed she could not straighten up for several days. Urination too frequent at this time but normal since. A slight leucorrhœa was present while in bed, but stopped a few days afterwards. Bowels have been constipated since she first noticed the trouble, requiring purgatives constantly The periods began at the age of thirteen, and have always been regular and normal, except t this last attack when she missed three or four months, following her confinement to bed. The patient the last three years had taken cold easily with hoarseness, which held on unusually long, but she had no cough between them. Th abdominal pains had totally disappeared the last six months. There had been very little increase in th abdomen the last eight months. On examination, the patient was very much emaciated. The abdomen was as large as nine months' pregnancy The whole abdomen was distended and a distinct fluctuation wave could be felt from any angle across the abdomen. The percussion note was dull with the exception of two small areas at either side of the lumbar spine. Changing her position did not alter the percussion note, due to the abdomen being so tightly filled with the tumor. Vaginal examination was negative. The temperature did not go above 99 F The W B C. was 8,000, reds 4,000,000, hæmoglobin 80 per cent. The urine was normal The only symptoms she complained of were shortness of breath and palpitation on exertion. A diagnosis of tubercular peritonitis was made with probable origin at the appendix or Fallopian tube. On opening the abdomen the fluid was found to be encapsulated. I then thought it to be an ovarian cyst, as they are the more frequent, but on examination the tubes and ovaries were normal, and the tumor had no attachments in the pelvis whatever I then decided to drain the cyst to make room in the abdomen for further examination. On cautiously going through the cyst wall, it was found to be made up of two distinct layers, the first a very vascular layer, which proved to be the omentum, and the second a fibrous layer which was the capsule proper After evacuating over three gallons of perfectly clear fluid, the cyst wall was easily removed from its omental bed, by dry dissection there being only five or six nutrient vessels which required ligation. The tumor had no pedicle whatever nor were there any strong adhesive bands connecting the cyst wall to the omentum. The omentum completely enveloped the cyst. The pathological report, which was made by D Wm Litterer of Nashville, Tenn was as follows. Nothing could be found to give a clue as to the origin The wall was quite regular in thickness and consisted only of fibrous tissue Internal to the capsule was a single row of cells, responsible for the secretion.

The patient made an uneventful recovery and left the hospital eighteen days after the operation.

PNEUMATIC RUPTURE OF THE BOWEL

By P A. BENDIXEN M D A J D BLYTHING M. D Davenport Iowa

PNEUMATIC rupture of the bowel is a condition in which the bowel is inflated through the rectum by means of air under high pressure with resulting rupture of the viscus intra abdominally

The case that came under our bservation is that of Paul M gdal ge 20, laborer single Austrian by birth admitted t Mercy Hospital December 9 at 3 30 A. M

Examination of patient on entrance t hospit l Patient conscious face little sallow and cyanotic grasping for breath facial expression was anxious and pinched. Enormous distention of abdomen skin very tense bdomen very tympanitic P tient had very little if any abdominal breathing Tem perature 98 4 Pulse, 114. Respiration, 38 Patient as nauseated and vomited some greenish colored material Complained of severe griping in abdomen Patient more comfortabl lying on right side. Legs flexed on thighs, and thighs on abdomen

Diagnosis The diagnosis of pneumatic rupture f the bo el in this case was easily made for the reason that clea history of the accident was given

Operation. Patient was given morphine gr 1/4 and tropine gr / 30 per hypoderml before opera tion Laparotomy was done bout two hours after th ccident median in cision was made from about a inch above the umbilicus and tending almost t the symphysis There was a little soiling f the peritoneum t the seat of perforatio on transverse colon near the hepatic flexure, and considerable amount of bloody serous exudate i the free abdominal cavity The bowel as enormously ballooned, very little air ha ing escaped at the free bdominal ca ty The serosa w much reddened and showed a considerable amount of injection the sigmoid colon was ruptured along the co ex border for a distance of about seven inches th a gaping tear in its serous and muscular coats through which the mucous coat bulged the peritoneum was more or less ribboned throughout the entire length of the tear The laceration on the sigmoid for the first t or three inches was virtually in fixed part of the gut There were three lacerations rangi g from t t four inches length the descending colon, one large laceration bout six inches long was found on the transverse colo near the hepatic flexure i the center f this lacerat on w f und small per foration of the bowel. Four lacerations ranging from one to four inches ere found on the ascending colon t lacerations bout t inches length were found on the ileum about 8 inches way from the cæcum A laceration of about 3 inches was found in the mesentery near the junction of the ileum with the cæcum nd large blood clot was removed from the mesentery at this point. The entire colon was very much congested and more especially about the cæcum A large number of hæmorrhagic areas, varying in size from one-fourth of an inch to three-fourths of an inch, were found in the small i testine There was no regularity in the outline of the hæmor rhagic areas.

Technique of operation All of the lacerations of the bowel were sutured with plain catgut. At the seat of the perforation o the transverse colon, plai catgut was used here ho ever w had to mak a slight inversion of the bowel n account f the ex tensive laceration and a reinforcement as made by a row of Lembert s sutures

After tying off a few small vessels the re t in the mesentery was likewise sutured with plain catgut.

After having examined the entire intestinal tract the abdomen was closed layer by layer without drainage Two deep silkworm gut tensio sut res, over gauze rolls, were introduced. The tim f the operation was ne hour and thirty minutes.

After treatment Patient was put t bed and placed in Fowler positio N rmal saline solution was gi en per rect m by the drop method one pint every four hours for the follo ing thirty-si hours It was necessary however t interrupt the saline twice during this tim on ccount of the ccumula tio of gas i the testine On ea h of these occa sions the administration of turpe ti and glycer ne enema sufficed to bring y large mov t f flatus and the saline was then resumed P tient was allowed t drink as m ch water as he desired.

On the same day t P M the patient tempera ture as 99 8° pulse 00 respiration, 30 The temperature ever exceeded 00° nor the pulse 100 This ma made uneventful recovery and left Mercy Hospital on J uary 3 9 3 r 4 days after the ccident

Cause of accident The accident in this case was caused in the following way the patient, a molder for one of our large foundries had completed his work and while waiting for the furnace heat, fell asleep a co-employee jokingly placed a compressed air hose near his rectum and then turned on the compressed air The air pressure at this time was estimated to be from 100 to 125 pounds. The air was forced through the clothing The patient was immediately stricken by his internal injuries and was unable to walk after the accident.

In reviewing the literature on this subject, we found that very little has been written on

this form of injury The only complete article was that of Dr E. Wyllys Andrews, on Pneumatic Rupture of the Intestine a New Type of Industrial Accident [1]

Since the publication of Dr Andrews paper we have been able to collect seven additional unpublished cases including our own

CASE (unpublished) History given by M G V Orth, Chief Adjuster of the American Car & Foundry Company Accident happened at Berwick Pennsylvania, August 18, 1905

Cause of the accident The man, while working in the sandblast house was held fast by two of his fellow workmen, while third employee applied the compressed air to his rectum The rectum was immediately seized with fearful griping pains the abdomen Patient was taken to the Berwick Hospital, where he was operated upon at once for pneumatic rupture of the bowel Patient died three hours after the accident Direct cause of death not given

CASE (unpublished) History given by M G V Orth, Chief Adjuster of the American Car & Foundry Company Accident happened at Milton Pennsylvania June 9, 1903

Cause of accident The compressed air in this case applied, joking manner to boy age 16 by man It was estimated that the air pressure this case was about 85 pounds the dial showing the record of the air pressure for that day the power house to be about 100 pound During four or five short periods the pressure was down to 85 and 90 pounds The hose this case some dust net from patch to The extent of the injury this case was not serious and the boy returned to work shortly after the accident

CASE 3 (unpublished) History given by M R C Richards General Claim Agent of The Chicago & North Western Railway Company Eugene Dargenau age 15 Date of accident March 1906 at the Chicago Railway shops

Statement of party who applied the compressed air hose I was polishing some brass with a buffing wheel and I asked Eugene Dargenau to apply the air hose to me and clean my clothes which he did and then I served him the same While placing the head of the air hose in between his legs, I must have applied it too close to his rectum because he immediately burst forward and complained of pain He then went to the closet down stairs after which he went home I have not seen him since I did not push the head of the power air hose through his trousers and I had only one-half of the power turned on I do not know how many pounds I applied but it was not very strong We were not fooling

In this case the boy went home on March 1906 and was treated by Dr B of Chicago until March 24 1906. Patient was admitted to Francis Willard Hospital on March 24, 1906 at 8 30 and was operated on by Dr A. J H Patient died March 5, 1906 *In Francis Willard Hospital.*

Post mortem findings by Coroner Warren H Hunter on March 26 1906 at Cook County Hospital Peritoneal cavity filled with blood, feces and a yellowish fluid In the large intestine about 8 inches from the rectum, a linear tear one inch long was found. Cause of death peritonitis and shock *following external violence*

CASE 4 (unpublished) History given by M Robert B Kay Claim Agent of The Hudson & Manhattan Railroad Company

Accident happened at the Fifteenth Street shaft New York 1905 In this case the injured man's abdomen was ballooned by having an air hose closely pressed against his rectum Patient received pneumatic rupture of the bowel Recovery was rapid and complete

CASE 5 (published) History given by D J V Denney Medical Director of the C. B & Q R R Chicago, Illinois Accident happened on the C B & Q Railroad

The victim this case working bent-over position and fellow-employee boy assisting air hose in spirit of mischief pushed the air hose violently against the victim rectum allowing the highly compressed air to escape at the bowel. The injured man in this case died soon after the accident

CASE 6 (unpublished) History given by Dr H C Groman, Surgeon for the Standard Steel Car Co Hammond Indiana

Patient boy age 15 was injured in the Standard Steel C C plant at Hammond, Indiana The accident this was caused by compressed air hose being placed to patient rectum by joking fellow worker Full pressure of compressed air was applied The patient abdomen was enormously distended pain severe and continuous pulse very rapid, heart showed signs of collapse patient became pulseless, lost consciousness respiration ceased and he was pronounced dead by the interne and another doctor Dr Groman was introducing rectal tube When patient showed the above signs of collapse *Dr Groman cared for Introduced* trocar through abdominal wall and allowed the air to escape but care was taken not to allow the air to come too rapidly order to prevent possible *chance* of reaction

Dr Groman, in his communication states the boy procedure brought patient back to life, respiration returned heart sounds and pulse improved consciousness returned

A laparotomy was immediately decided upon, patient was anesthetized and the usual incision made When the incision was made through the

[1] SURG GYNEC OBST January In this paper Dr Andrews reports case of his own and gives collection of other cases

abdominal wall more or less escaped from the free peritoneal cavity

The peritoneal cavity was filled with a serous bloody exudate and particles of fecal material were found. The peritoneum was ruptured at nearly every conceivable point there were very few ruptures of the intestinal wall the muscular layer was torn in some instances but the serosa was extensively torn The main laceration was near the rectum

Operation The lacerations were sutured and abdominal section was sutured Drainage tube was left in abdominal cavity

After treatment Efforts were made to combat shock but patient died four hours after operation

Now in taking up the subject of pneumatic rupture of the bowel we note that all of these cases are the results of initiations, hazing or carelessness on the part of the workmen with the compressed air hose It is evident that this practical joking must be common and it is very probable that many more minor or trifling accidents have happened which are not reported In all of the cases cited in this paper the air had to pass through one or more layers of cloth to enter the anus Yet this obstruction did not seem to delay its destructive or deadly work In several cases reported by Dr Andrews, and in some of our cases just reported it will be noted that the compressed air nozzle was at least an inch or more from the body Why is it then that we have such destructive force in the application of compressed air? First We are personally convinced that 100 to 125 pounds of air will form a solid column of air several inches in advance of the hose or nozzle which would almost act like a solid body forcing open the sphincter muscles Second Dr Andrews has pointed out that the anatomical arrangement of the perineum is such as to facilitate the concentration of air pressure at the anal orifice

This anatomical condition is a peculiar formation of the pelvic floor forming a funnel, whose apex is at the anus the confined air expanding in this funnel will force the gut open without having the end of the pipe accurately adjusted to the anus With the involuntary contraction of the levator and sphincter muscles the space between the buttock would be narrowed and the funnel deepened thus confining the escaping air laterally and leading it the more quickly into the bowel.

The following is an abstract from Dr Andrews article in regard to the amount of pressure required to rupture an intestine With an air pressure gauge and tank of compressed air he showed that the ordinary bursting point in a dog or ox intestine was from six to ten pounds. The human intestine showed about the same bursting point when removed from the body Whether the strength would be greater in the living body we do not know but probably there would be a slight difference Dr Andrews also tested numerous specimens of stomach bladder and intestines obtained at meat shops and from dog experiments and found that none of the specimens were capable of bearing over 12½ pounds the freshest specimens bursting at about 7 or 8 pounds. Senn experimenting on the cadaver of a case of enteritis, found that the diseased bowel ruptured at 1½ pound

Pathology Several cases reported by Dr Andrews speak of minor bruises about the anus In nearly all cases reported the pathological condition is found intra-abdominally and consists of hemorrhages in the serosa lacerations of the serosa and muscular coat with a bulging of the mucous membrane or there may be a complete rupture of the bowel through the serosa, muscular coat and the mucous membrane

The sigmoid in nearly all cases is affected The descending transverse ascending colon together with the small intestine and mesentery may show signs of traumatic injury due to compressed air applied through the rectum The extent of injury to the bowel will depend upon the patient physical condition whether the bowel is full or empty and the amount of air pressure applied Air is usually found in the free peritoneal cavity Hemorrhage and ecchymosis of the bowel are to be expected in all cases

The symptoms in cases of pneumatic rupture will depend largely upon the extent of internal injuries but some of the following symptoms are characteristic First pain is immediate severe and continuous second the face is usually sallow and somewhat cyanotic, the facial expression anxious and pinched third the abdomen enormously

distended skin tense percussion note tympanitic very little, if any abdominal breathing this depending upon the amount of distention the patient may or may not be conscious. Temperature usually normal in the early stages, but in the latter stages we may have a marked temperature due to absorption of blood and local or general peritonitis. Respirations are increased from 15 to 40 per minute pulse rate increases somewhat but its volume varies in proportion to the amount of internal hemorrhage and degree of shock nausea and vomiting are commonly present The legs are usually flexed upon the thighs the thighs upon the abdomen, causing relaxation of the abdominal muscles, and thereby making the patient more comfortable In extreme cases we may have an emphysema of the surrounding structures. Rectal hemorrhage may or may not be present

Diagnosis We believe from the reports of Dr Andrews and with these additional cases it should be possible to make a diagnosis of this form of injury even in the absence of the history as we may some day be confronted with an individual who is unconscious or one who is unable to speak the English language The following points will be of diagnostic value First, the tense air filled peritoneal cavity second the extreme pressure on the diaphragm causing a thoracic breathing and eliminating the abdominal breathing third emphysema of the tissues as reported in some of Dr Andrew cases without signs of inflammation fourth the common general symptoms of an abdominal injury

Differential diagnosis would have to be from ileus, perforation ulcer or wounds, fractures of the ribs or injury to the air passage causing an emphysema

Prognosis In combining our cases with those of Dr Andrews, we arrive at the following results

Cases not operated upon show a recovery of 8 6 per cent

Mortality in operative cases, 39 1 per cent

In those cases operated upon the percentage of recovery is 21 per cent. This preponderance of deaths over recoveries in the cases operated upon must be explained by the failure in so many instances to make an early diagnosis and more especially to resort to an early operation.

Treatment Conservative treatment in these cases should not be considered It may be necessary in some cases to institute a preliminary introduction of a trocar through the abdominal wall under aseptic precautions, to permit the escape of sufficient air from the free abdominal cavity to facilitate later operative procedures. No attempt should be made to wash out the bowel prior to operation The condition should be treated as a rupture of the intestines from blows and the earliest possible exploratory operation should be done

The lacerations and perforations should be sutured and if large amount of fecal material is present in the free peritoneal cavity a drainage tube should be inserted.

Post-operative treatment Patient should be placed in Fowler's position Normal saline by the drop method should be given per rectum and all further treatment should be directed toward meeting the symptom as they arise

A paretic condition of the bowel may be expected The rectal tube and turpentine or glycerine enemas will be found useful in relieving the patient from the oppression of gas.

In conclusion we want to impress upon you the following First, that compressed air is a very universal necessity in modern industries second, a strong warning verbally and by prominently displayed signs should be given each foreman and employee against all practical joking or hazing, with the air hose third that air rushing from a compressed air hose can enter the body through the clothing and cause serious laceration of the bowel proving fatal in many instances fourth, that the diagnosis of this accident should be made from the physical signs alone fifth, that the sigmoid is the most common seat of injury

In closing this paper we desire to express our thanks to those who have enabled us to collect the histories of the above cases and to acknowledge our indebtedness to Dr Andrews, from whose pioneer article on this subject we have so freely drawn

Since this article was submitted for publication the following additional case has been reported to us by Dr Paul M Mecray of Camden, New Jersey

On July 24 1923, a robust Italian boy aged 17 employed by a large wood working establishment was frolicking with some other boys during the noon hour. One of them seized a compressed-air hose which was used for clearing the bench of sawdust, and applied the nozzle to the rectum of the victim. The maximum pressure employed in this plant was eighty pounds to the square inch, but the shop superintendent estimated that at the time in question the pressure was not above ten pounds.

The investigation showed that the hose was held several inches from the anus, and that the air passed through trousers and drawers. When the boy was admitted to the hospital the following note was made by the resident, Dr T M Kain

Patient was brought to hospital in ambulance at 1.40 P M. The only history obtainable was to the effect that patient while sitting on a box had suddenly fallen to the floor Upon arrival at the hospital he was found to be dead.

Examination showed no visible marks of injury no lacerations, bruises, no fractures. There was a small abrasion on the lip, and the tip of tongue. Abdomen was markedly distended and there seemed to be free air in the abdominal cavity Air was also present in subcutaneous tissue all over the body very pronounced in the pectoral regions.

At the necropsy conducted by County Physician Frank O Stem and Dr Mecray the thighs about the anus were found to be ecchymosed, and the anal sphincter stretched so as to admit four fingers. There was general emphysema. On opening the abdominal cavity air escaped under great pressure. The colon was ruptured in eight places and showed the effect of stretching before rupture occurred. There was general venous engorgement and many ecchymotic areas scattered through the small bowel.

AN ARTIFICIAL URETER MADE FROM THE ABDOMINAL WALL

A Preliminary Report of an Experimental Study

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MANY attempts have been made by various investigators to replace a portion of the ureter which has been destroyed anatomically and functionally by inflammation stones, benign or malignant tumors.

Prominent among the surgeons who have attempted a solution of this problem are Casati, Boari and Israel who used tubes of silver glass and caoutchouc. Casati, Boari and Van Hook cut a flap out of the bladder and sutured it in the shape of a tube to the proximal end of the ureter. Rydygier did the same with a flap of skin. Fenger and Bacon Pogg and Tizzoni D'Urso and DeFabi, Esau and Moskowicz employed loops of the intestine separated from the rest of the bowel, but still attached to their mesentery, while Giannettasio Rydygier and Franke transplanted the appendix in the same way and D'Urso DeFabi Florcken and Stubenrauch used the uterine horns of bitches. The function of the ureters was generally impaired or destroyed because of the frequent stenosis and infection but the transplantation of the uterine horns gave better results.

In 1908 Melchior and afterwards Rich, Holbauer and Klepp tried to replace in dogs a piece of ureter with various blood vessels. Tetze and Florcken soon found the transplanted vessel replaced by connective tissue. Chasserinl and Dominici used external jugular femoral and saphenous vein and sometimes the carotid artery. They came to the following conclusions.

1. There is a possibility of the vessel introduced between the ureteral ends becoming firmly united to them.

2. A few days after the operation the piece transplanted becomes shortened so as to draw the two ureteral ends nearer together.

3. The graft becomes thicker and harder while the lumen is nearly obliterated.

4. The stenosis causes a stoppage in the flow of the urine with consecutive dilatation of the canal of the ureter and hydronephrosis.

It will be noticed from the above that the various structures and organs used for transplantation have very important physiological functions. To destroy or sacrifice such an organ or structure for transplantation to another organ is not very practical.

For this reason, and in order to make a transplantation that is practical, I have tried to keep my work within the limits of the following principles:

1. The part or structure used shall be adjacent and along the line of the ureter.

2. The part or structure used for transplantation shall have no important physiological function, nor be part of an important or vital organ.

3. The transplant used shall retain two of its most important physiological requirements in order that it may remain in its highest state of resistance namely a definite nerve and blood supply.

With the above facts in mind the following surgical procedure was carried out. An incision was carried from one-half inch below the angle of the twelfth rib in the midaxillary line downward to within one inch mediad ward of the anterior superior spine of the ilium. The muscles were divided down to the transversalis. The internal oblique was divided and dissected back as far as its iliolumbar fascial attachment laterally and mediadward to the belly of the rectus muscle. This exposes the transversalis muscle as shown in Fig. 1 with its blood and nerve supply the anterior branches of the lumbar arteries and nerves.

A flap was now made as is shown by the dotted line in Fig. which includes the transversalis muscle fascia and peritoneum. The peritoneum, fascia and muscle were closed

Accepted for publication October 31 1917. Read before the Chicago Surgical Society November 9 1917 [illegible]

with one suture starting at the superior angle of the pedicle of the flap and while suturing the pedicle the sutures only penetrated the peritoneum and transversalis fascia, as shown in Fig 2

The operation is now absolutely extra peritoneal The ureter was exposed in the region of the flap and the two small ureteral arteries which are on each side of the wall of the ureter were tied with fine arterial silk at both the distal and the proximal end Two or three inches of the ureter were next resected A temporary ligature was placed on the proximal end of the ureter The lower free edge of the flap was picked up and the peritoneum and transversalis fascia separated from the transversalis muscle for about 0 5 cm An end-to-end anastomosis with the distal end of the ureter was made in such a way that the fascia and peritoneum were slightly within the ureter and the muscle without as shown in Fig 3

The proximal end of the ureter was placed on the upper portion of the flap and an end-to-end anastomosis made by a continuous circular suture Here however the peritoneum is not within the lumen of the ureter (Fig 4) The edges of the flap were closed to complete the tube using a continuous over and over suture going upward and crossing this with a suture downward so as to make a figure X (Fig 5) Fine arterial silk was used for the anastomosis and flap closure The temporary ligature was removed and the artificial ureter as well as the ureter below the anastomosis became distended with urine and the rhythmic ureteral wave passed on over the ureter A fine rubber drain was left in the wound for the first few days to allow for the slight leakage of urine that might occur

At the end of seven months one of the dogs was anæsthetized and opened The pedicle of the flap was normally intact The artificial ureter was shortened to about one third the original length so as to draw the ureteral ends nearer together The circumference and lumen of tube were of the same size as when first constructed The tube as a whole felt hard and non-compressible The peritoneum was adherent to it on one side and to the internal oblique on the other Many well defined blood vessels could be seen adjacent and in the adherent tissues. The ureter was now divided three inches below the distal anastomosis and urine came through in jets in about normal quantity

The specimen was removed and an opening made in the ureter about one inch above the proximal anastomosis A probe could be passed with ease through the artificial ureter and its anastomoses and also a second smaller probe could be passed alongside of it. The hardened artificial ureter was opened with scissors. It cut with difficulty Its inner surface appeared smooth and had the appearance of a lining membrane The body of the tube felt hard This we assumed to be due to infiltration of calcium and urinary salts. The anastomoses showed no evidence of contraction or stenosis The kidney showed no changes.

Six and one half months after operation dog No 2 was anæsthetized (Fig 6) The artificial ureter showed the same hardness and shortening as in No 1 This time the bladder was opened and the papillæ examined The urine came through the ureter but not as freely as No 1 The papillæ appeared normal On opening the artificial ureter a fair sized calculus was found lodged in the distal anastomosis This calculus had the end of a fine silk thread as its nucleus and undoubtedly produced the partial obstruction and a corresponding dilatation of the ureter and hydronephrosis The anastomoses however showed no contraction and the lumen of the artificial ureter was of the same size as originally made

Dog No 3 was anæsthetized six months after operation and showed the same as No 2 Here the artificial ureter was so large as to form a pouch, which caused a slight dilatation of the ureter and a hydronephrosis but no stenosis of anastomoses In this experiment the artificial ureter was made exceptionally large which accounts for the pouching

Dog No 4 which was very small was examined five and one-half months after operation A contraction was found and an almost complete obstruction of the lower anastomosis and a marked dilatation of ureter and hydronephrosis.

Histology A section of the artificial ureter was taken from each of the above specimens. The portion taken was midway between the proximal and distal anastomoses and showed (1) in place of the peritoneum a typical transitional epithelium together with its basement membrane outside of which is a thin layer of areolar tissue. (2) In place of the transversalis fascia a layer of bone was seen well organized with typical osteoblasts, blood vessels and lymph-vessels. (3) The transversalis muscle showed no changes. The epithelium is probably a proliferation of the epithelium from the ureter since it is of the transitional type and has the same appearance as that in the ureter proper The basement membrane of the peritoneum acts as a matrix for its implantation. The transformation of the transversalis fascia into cartilage in the earlier stages and into bone in the later stages *is explained on the following embryological* and chemical basis.

Embryology The abdominal wall is formed originally from the mesoblastic somites the median portions of which lie in immediate contact with the notocord and are known as the sclerotomes. They grow inward toward the median line surrounding the spinal cord and forming the vertebræ while the lateral portions of the mesoblastic somites form the musculature and are known as the myotomes These lateral portions grow ventrally until they meet in the midline their fellows of the opposite side Thus we see the vertebræ and abdominal musculature formed from one *embryological layer and structure—the meso*blastic somites

Chemistry The flap in its original position is in contact with a neutral media the peritoneal fluid and alkaline reaction of the blood and lymph When transplanted it comes into *contact with the urine which is acid, due to the* acid sodium phosphate content. The tissues probably become infiltrated with this acid medium which produces a sclerosis, and according to H Gideon Wells calcification and ossification commonly occur in tissues which have an excess of acid present The cartilage stage which is seen in the dog five and one-half months after operation also speaks in favor of the hypothesis. Cartilage which is the favorite site of calcium deposits takes on a basic stain implying that it is of an acid reaction and this in turn is probably due to the presence of chondroitin sulphuric acid The flap, which originally had a definite blood supply *is reinforced by new blood-vessels* as may be observed in the histological sections. We know the plasma from the blood and body fluids furnishes calcium which infiltrates the cartilage to form bone which is seen in the later stage in sections (Fig 11) Thus we note on the one hand the acid infiltrated tissues showing slight degenerative changes due to the irritating action of the urine forming an acellular matrix of cartilage on the other the body fluids which infiltrate the cartilaginous matrix with calcium, converting it into bone These two facts, together with the osteogenetic potentiality inherent in this particular group of muscles and fascia account *for the transformation of the transversalis* fascia into a bony plate.

The histological sections show that practically few or no degenerative changes have taken place where the bone is formed. This is in marked contrast to the process involved in pathological bone formation, in which a granular detritus becomes infiltrated with calcium then undergoes vascularization and is changed into bone. Our own sections, however show a bone formation closely resembling that of normal bone with a cartilage stage then a calcium infiltration and finally a bone formation. It will also be noted in these section that the bone contains many *large blood vessels and lymph spaces* the transversalis muscle which surrounds the bony plate is also well preserved and highly vascularized, all of which speaks largely against a degenerative process of any extent having taken place

To strengthen the above hypothesis of bone formation and to show that it is not unusual for bone to be found in the body irrespective of its proximity to bone tissue, I will cite a report of autopsies by Poschariesky In 29 cases of calcified areas in the eyeball following suppuration bone was found in 25 of them Calcified nodules from the lungs of 28 persons were examined and in 17 of them bone was found. In 3 of 14 calcified nodules of heart

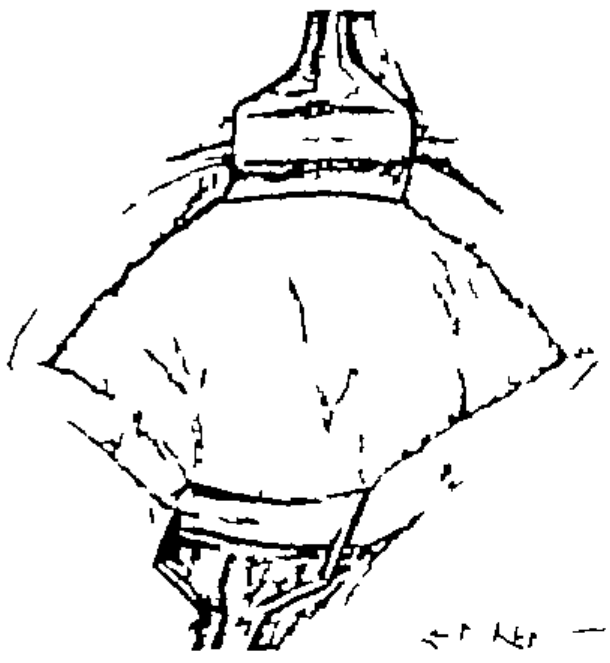


Fig Operative procedure



Fig Operative procedure

valves bone was present Calcified nodules in the liver and in the mesenteric gland are also often ossified and in fact there is hardly a tissue in the animal body in which the transformation of calcified into ossified tissue has not been observed

The explanation of this pathological bone formation is given by H Gideon Wells in his classic monograph on ossification and calcification as follows The process by which these inert dead calcified areas are converted into living bone tissue is entirely analogous to the normal formation of bone in endochondral ossification The calcified material simply takes the place of the primordial cartilage vascular granulation tissue invading it and the cells of the granulation tissue undergoing a differentiation into osteoblasts which constitute an osteogenetic layer and form the new bone When there is no preliminary calcification of dead tissue we get the subsequent ossification and it seems that the calcium salts exert specific influence on the mesenchymal cells which cause them to take on osteogenetic growth and to undergo a metaplasia not only into osteoblasts but apparently even into marrow

Lacking objective information concerning the fate of the rabbit kidney within sixteen to twenty days after ligating the renal artery provided he wrapped the kidney with omentum to secure a free collateral circulation Without this collateral circulation it requires about three months for ossi

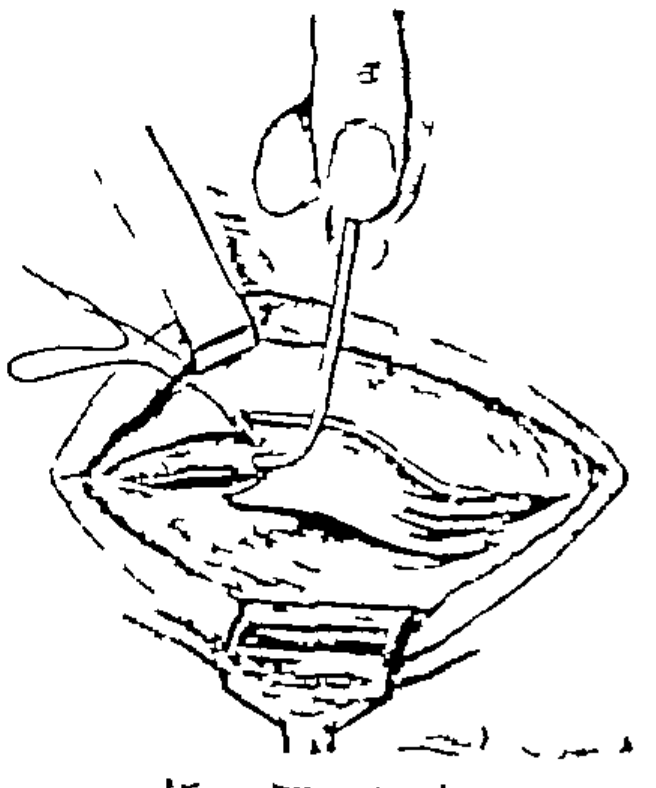


Fig Operative procedure

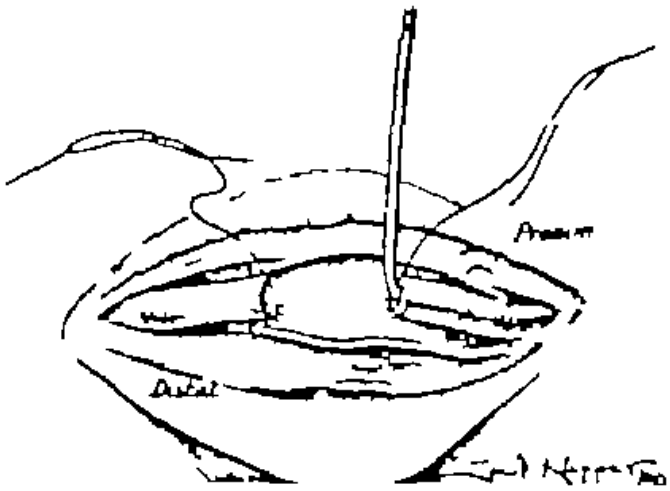


Fig. 4 Operative procedure

fication to appear These and other experiments by the same author show that the amount of blood supply is an important factor in determining pathological ossification With too free a circulation there is no calcification and no ossification With too little circulation necrosis is followed by slow calcification and either lat or no ossification. Liek s experiments on rabbits which have a neutral or alkaline urine throw some doubt on the acid urine infiltration theory So it is possible that some other chemical factor produces this irritation or that the tissues are in contact with an unaccustomed chemical medium.



Fig 5. Operative procedure.

The same surgical procedure was tried on the common bile duct but with mdifferent results. This was undoubtedly due to the difficulty with which the anastomosis was made. We have also some living dogs, operated three months ago, in which a free transplant was used instead of a pedicle transplant. The results of the latter will appear in the near future.

CONCLUSIONS

1 The flap from the abdominal wall forms a patent non-collapsible bony tube lined by

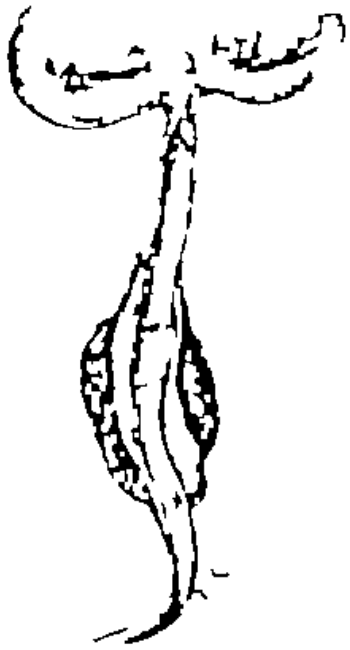


Fig 6 Six and one half months after operation.

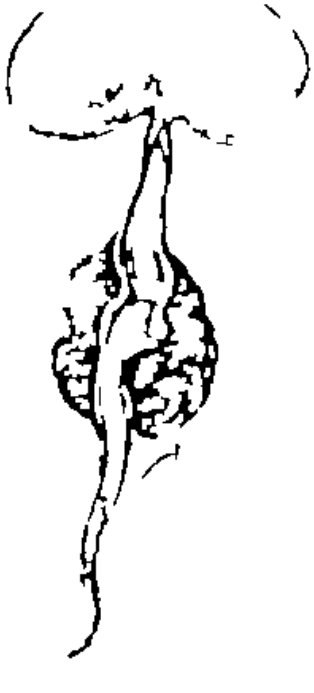


Fig 7 Five and one half months after operation



Fig 8 Six months after operation



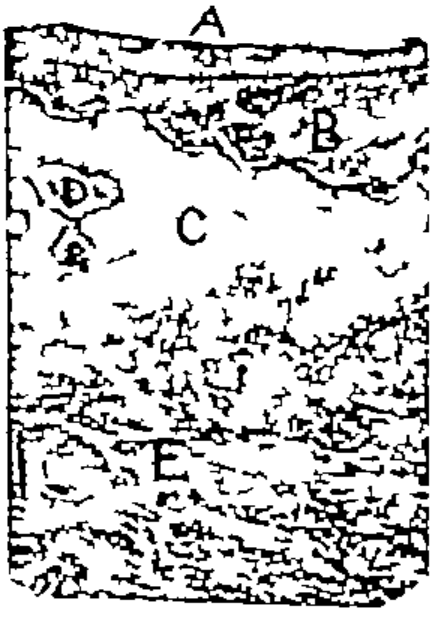
Fig 9



Fig



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Fig

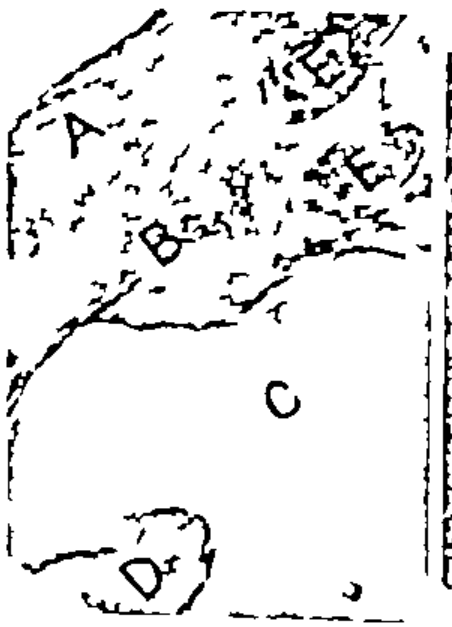


Fig. 3

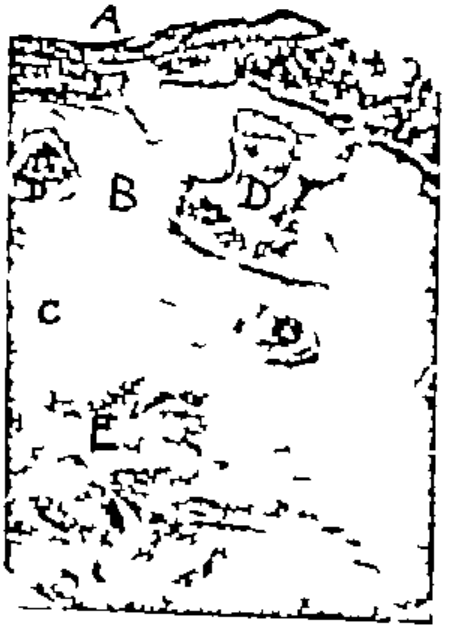


Fig 14

Fig 9 Section showing cartilage A, transitional epithelium B, cartilage C, blood-vessel

Fig A, epithelium, B, areolar connective tissue C, bone D blood vessels and lymph spaces in bony plate E, transversalis muscle

Fig Fig under high power A, transitional epithelium, B areolar connective tissue, C, bone D blood-vessels

Fig A, epithelium B, areolar connective tissue C, bone D blood-vessels in bony plate E, transversalis muscle

Fig 3. Fig under high power A, epithelium; B areolar connective tissue C, bone D large blood-vessel, E, blood vessels in areolar connective tissue.

Fig. 14 A, epithelium B bone C, cartilage remaining in bony plate D blood-vessels, E, transversalis muscle.

transitional epithelium and covered by the transversalis muscle

2 Anastomosis remains patent on account of the non-collapsibility of the bony tube and the hydrostatic pressure within the ureter

3 Hydronephrosis occurred in several cases in one due to a calculus in another due to the pouching of too large an artificially made ureter and probably the interruption of the ureteral peristaltic wave.

I wish to thank Dr J W Jobling and Dr E Kirk for the valuable advice and suggestions they have given me while carrying on this work.

THE RELATION OF MULTIPLE ADENOMATA TO THE ETIOLOGY OF THE ENLARGEMENT OF THE PROSTATE GLAND

By JAMES A GARDNER, M D AND BURTON T SIMPSON M D Buffalo New York

In 1911 one of us, in studying the growth centers of the benign adenomata of the thyroid and prostate glands was struck by the frequency with which these tumors were the apparent cause of the enlargement of the prostate gland and also by the fact that one could find isolated small adenomatous nodules in normal sized prostates before the so-called hypertrophic age, namely between forty and sixty years of age

In reviewing the literature of prostatic hypertrophy it was surprising to find that English and American authors were not inclined to accept true adenoma formation as an important factor in the etiology of this condition In the first paper only seven enlarged prostates were studied, but from the fact that the entire seven showed adenomatous enlargement it occurred to us that a study of a greater number of glands would give valuable information concerning this factor in the etiology of this condition

In reviewing the literature one finds a great diversity of opinion regarding the genesis and pathological anatomy of the condition commonly called prostatic hypertrophy

Virchow ( ) taught that the so-called hypertrophy should be separated into two classes one belonging to the myomata and the other to the gland tumors from which we must conclude that he considered the enlargement of the prostate as a true tumor formation.

Billroth (2) wrote that in so far as his investigations went prostatic hypertrophy was never connected with adenoma formation, but was a dilatation of the acini with perhaps some hyperplasia. He believed that nodular or diffuse myoma formation was common.

According to Socin (3) prostatic hypertrophy is a name given to a variety of pathological conditions having in common the enlargement of this gland. In his opinion the ordinary enlargement is neither of inflammatory origin nor a true hypertrophy but a true tumor formation

Cohnheim (4) stands out definitely for the tumor theory as may be concluded from the following The new growth which one commonly calls hypertrophy of the prostate is neither inflammatory tissue nor notwithstanding its name legitimate hypertrophy but true and undoubted tumor formation

Lannois (5) a pupil of Duyon did not consider senile prostatic hypertrophy as true tumor formation, but as a part of an extensive arteriosclerotic process which begins in the kidneys and extends throughout the entire genito-urinary system

Rindfleisch (6) assigned the cause of prostatic enlargement to tumor formation He described two forms the more rare fibrous, accompanied with atrophy of the glands and the much more common form namely the discrete nodular adenomatous.

Birch Hirschfeld (7) considered the enlargement of this gland as an expression of new growth, and assigns its origin to the budding of the gland tubules

Lydston (8) believed that prostatic hyper



Fig Early isolated adenoma, ith slight indication of capsule ith connectiv tissue and gland substance becoming compressed



Fig Same a Fig but later stage

trophy began in the period of sexual activity and was the result in the majority of cases of sexual excesses

Jores (9) called attention to the fact that apparently hypertrophy of the so-called mid dle lobe took its origin in the suburethral accessory glands

Aschoff (10) demonstrated these suburethral accessory glands not only in the males but also in females in the new born

Chechanowski (11) wrote a voluminous article supporting the inflammatory theory of prostatic enlargement, particularly emphasiz ing the part played by gonorrhœa He be lieved that a long continued chronic inflam mation was the basis of the changes which take place in prostatic hypertrophy He admits that true adenomata and myomata may occur rarely but they have nothing in common with prostatic hypertrophy

Beginning with Albarran (12) the majority of French in estigators, Motz and Pereamau (3) Marion (14) Marquis (15) and Che vassu (16) hold that prostatic enlargement is due to true tumor formation their only dif ference of opinion being in regard to whether they take their origin solely from perurethral accessory glands or whether they may spring from any part of the gland itself

Stoker (17) does not believe in the so-called middle lobe but holds that the enlargements which occur at the proximal urethral orifice are caused by either myomata or adenomata. The enlargement of the gland proper he con siders as a true hypertrophy which may be associated with encapsulated adenomata.

Rotschild (18) advocated the inflammatory theory and believed the enlargement was due to dilatation of the acini caused by obliteration of the excretory ducts. Bangs also up holds this view although he believes that gonorrhœa plays little or no part in the process but would emphasize the factor of long-con tinued congestion which occurs in long-con tinued and often repeated sexual excitement

Wichmann (19) in an investigation of the etiology of prostatic enlargement concluded that inflammation plays little or no part in the production of this condition

Wallace (20) Tietze and Lendorf (21) accept prostatic enlargement as adenoma formation the latter holding that the tumors always spring from the perurethral accessory glands

Alexis Thomson (22) in a series of ninety enlarged prostates wrote that he had never met with an encapsulated adenoma or fibro-adenoma, and doubts if such exists He believes the enlargement to be due to diffuse



Fig 3. Cross section of prostate in region of colliculus showing isolated nodule in lateral lobe.



Fig 4 Showing multiple adenomata in prostate.

hyperplasia of both the gland and musculo-fibrous tissue

Von Frisch (23) declares that we can only conjecture concerning the cause of these idiopathic tumor formations, the definite cause being unknown.

Adami and Nichols (24) teach that while prostatic hypertrophy may precede the development of definite neoplastic conditions within the organ it must nevertheless be sharply distinguished from the same With the more recent authorities we should regard it as the outcome of a long-continued, chronic inflammation more particularly involving the urethral portion of the gland."

Simmonds, in Aschoff's Pathological Anatomy writes that the more recent thought concerning prostatic hypertrophy gives a very subordinate place to the inflammatory and considers the enlargement of this organ to be due to true tumor formation.

G Cuttat (25) in 1912 in summing up his studies on the etiology of prostatic hypertrophy writes as follows

"(1) Etiologically speaking it is not possible for us to admit that an infection leading to chronic inflammation can explain prostatic hypertrophy

(2) That hypertrophy of the prostate does not enter into the category of true tumors.

"(3) The prostatic hypertrophy is a true fibro-epithelial degenerance which finds its analogy anatomo-pathologically in fibro-epithelial tumors of the thyroid and breast, the glandular and connective-tissue elements taking nearly equal parts in augmenting the volume of the gland the cellular infiltration being of secondary origin."

In summing up this review of the literature one must admit that there is a diversity of opinion concerning this pathological process It would appear that the more recent investigators are in accord with the view that the condition is a new growth The discussion at present seems to be concerning the origin of these tumors For instance, Motz Marion Marquis, and Lendorf believe that these adenomata always arise from the periurethral accessory glands, while Chevassu writes a paper the sole object of which is to refute this theory which he says is against the teachings of his master Albarran. On the other hand Tandler and Zuckerkandl (26) believe that prostatic hypertroph always takes its origin from the middle lobe which they describe as that part of the prostate which lies between the urethra and the ejaculatory ducts

The material for our study consists of one hundred prostate glands, eighty of which were obtained at autopsy and twenty from operation

The ages of our cases are shown in the following table



Fig 5 Section of half prostat showing large adenomata lying outside of fibromyoma

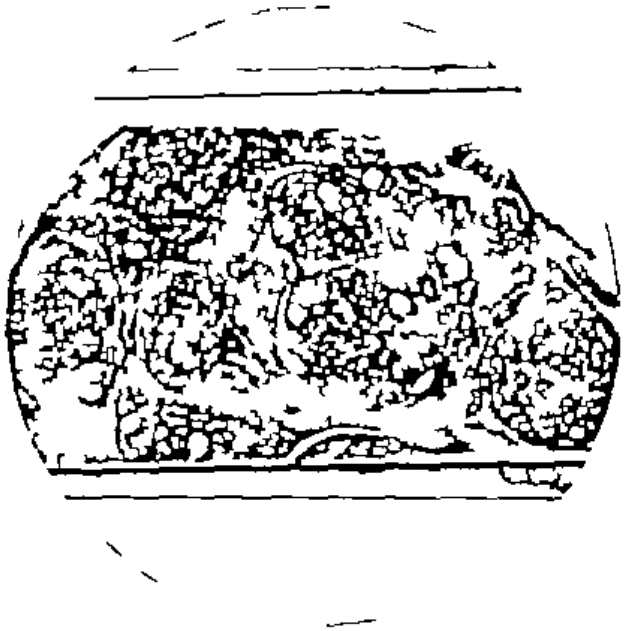


Fig 6. Section of prostate showing multiple adenomata well isolated and marked off by distinct capsule

TABLE NO I

Age	0–20	20–30	30–40	40–50	50–60	60–70	70–80	80	Total
No		3		79		18	6		80
				OPERATION					
No							5		20

That prostatic enlargement may occur as the result of the dilatation of the acini or from other of the causes assigned to it is not denied here but that eighteen of the twenty enlarged prostates which occurred in our series were the result of true adenomata formation there can be no doubt, and we believe the majority of enlarged prostates are due to this cause There are many circumstances which lead one to this conclusion In the first place it is against pathological principles to expect true hypertrophy at the time of life when enlargement of this gland occurs. As a matter of fact the prostates in our series that did not show adenomatous enlargement at this age showed atrophy On the other hand, we find benign neoplasms at this age, as is illustrated by the adenomata of the thyroid and myomata of the uterus

Many other theoretical considerations could be advanced But what is more essential is the demonstration of the development of these adenomata from tiny isolated nodules to an enlarged gland filled with such tumors.

If we study a series of prostates of men between the ages of forty and sixty we are enabled to demonstrate such a development as has been heretofore spoken of

Of the exact origin of these nodules we know as yet very little Various investigators have explained their origin in various ways. For instance, Motz Marion Cuneo and others believe that these adenomata always have their origin in the periurethral accessory glands. Birch Hirschfeld describes them as being the result of budding of the gland tubules. Tietze believes that these tumors spring from isolated nodules which are separated from each other by loose connective tissue Chevassu does not agree with some of his confreres in regard to the periurethral glands as being the sole place of origin of these tumors, but believes that they may arise from any portion of the gland We are in accord with Chevassu in this regard for we have found adenomatous nodules in the so-called surgical capsule which also disproves Tandler and Zuckerkandl's theory that prostatic hypertrophy always begins in the middle lobe. Besides this we have found normal gland tissue between the adenomata. Personally we are inclined to believe that these tumors originate from isolated glandular tissue and that this may occur in any part of the prostate gland.

We think that by studying the following



Fig 7 Lower left quadrant of enlarged prostate showing multiple adenomata

table one may draw interesting conclusions

TABLE NO

Ages	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Totals
Normal			6		14				
Adenomata									
OPERATIONS									
Myomas or interstitial proliferation									
Adenomata					10				18
AUTOPSY PAST 40 YEARS									
Normal				14					43
Adenomata									

In studying the fifteen prostates between the ages of one and forty only one (thirty eight years) was found in which adenomatous nodules were present Between forty and sixty twelve were found which contained these nodules or forty three per cent While in the twenty four prostates between sixty and eighty but two (6 and 63 years) were found that contained only isolated nodules the others being adenomatous enlargement We may assume from these facts that between the ages of forty and sixty is the common period of the first appearance of these nodules or the beginning of prostatic enlargement In the period between sixty and eighty these nodules reach their maximum and produce the clinical symptoms which we recognize as prostatic hypertrophy If we consult Table No 3 we will notice that the prostates in this series

TABLE NO

Age	40-60	60-80
Isolated Adenomata		
Adenomatous enlargement		
Normal	29	10
Atrophy		
Normal to adenoma formation		

of individuals between sixty and eighty show one of three conditions, viz adenomatous enlargement an atrophy or were normal

In studying adenomata of the prostate gland it is necessary that one use the lowest power lenses on the microscope or a simple lens. The most convenient is the dissecting microscope By this method it is very easy to pick out these little nodules from a slide containing a cross section of the prostate. In the younger nodules one is attracted by a round or oval, deeply-stained nodule around which can be seen a thickening of the adjacent tissue (Fig 1) Fig 2 shows a little later stage in the development of these adenomata The epithelium has proliferated and resembles the normal epithelium of the prostate when seen with the higher powers of the microscope

The interstitial tissue varies from the normal in that there is a marked preponderance of the connective-tissue element. One notes already the compression of the surrounding normal prostatic tissue with its low epithelium, which is in marked contrast to the high columnar of the adenomata. Fig 3 depicts a still later stage in the development In this section we note that the epithelial element predominates, also at the sides we can see the compressed normal prostatic tissue

In conclusion we would say that so far as our research with enlarged prostates reaches, the condition in the majority of cases is caused by the growth of multiple adenomata

NOTE The so-called surgical capsule made of compressed prostatic gland and containing distinct small adenomata This demonstrates the fallacy of Tandler and Zuckerkandl theory that the prostatic enlargement always springs from middle lobe

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DEPARTMENT OF TECHNIQUE

THE TREATMENT OF RECURRENCES AND METASTASES FROM CARCINOMA OF THE BREAST

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THE group of patients indicated by the above title are usually regarded as hopeless, and at present we must admit that no method of treatment is entirely satisfactory. Some remarkable results have been accomplished by the methods that I shall describe, but these results are far from ideal, and in the end failure is the rule and complete success is the exception. Even with this dismal introduction, I am not without hope. More has been accomplished by radiotherapeutic measures than by any other method of treatment of this group of cases. The partial success obtained may point the way to complete eradication of the disease and permanent cure.

GENERAL REMARKS ON THE METHOD OF TREATMENT

In general, the treatment has consisted in the application of the roentgen rays as promptly and as vigorously as possible after the patient has been first brought to my attention. The rays have been applied from as many directions as *possible, and carried to the limit of skin tolera*tion, after filtration. To this has been added every measure that would tend to improve the patient's general health, so far as circumstances would permit. Combined with the above results I have added small doses of thyroid extract.

The use of thyroid extract. It is well known that the rays, applied to the thyroid gland, tend to diminish its secretion, and in time lead to atrophy of the gland. In the application of the rays for recurrences and metastases from carcinoma of the breast, much of the radiation reaches the thyroid gland, and therefore, theoretically would tend to diminish the secretion. This fact, together with the fact that at the time of life when carcinoma is most common the thyroid secretions naturally tend to diminish, leads me to believe that the administration of thyroid extract is distinctly indicated. During the past two years I have used thyroid extract in one hundred and fifty cases, and I am led to believe that it has improved my results to a considerable extent. I believe that with increased knowledge, the administration of the extract can be regulated so far as to accomplish even more.

I usually begin with the administration of one-half a grain of thyroid extract, three times a day after meals. This is increased every four days one-half a grain in the daily dose, until the patient is taking one and a half grains three times a day. I have not at any time given over two grains, three times a day.

In only a few patients have I obtained any symptoms that I think can be referred to the administration of the thyroid extract. These symptoms consisted of an increased pulse rate, a sensation of faintness and weakness, and at times a slight headache. These symptoms disappeared after the interruption of the thyroid extract for a week.

CASE. Mrs. C., age 6[illegible], was referred to me by Dr. Ernest Lapham on October 29, 1909. She had been operated upon by Dr. Lapham for carcinoma of the left breast three years previously. During [illegible] year recurrences with pain had been developed in the operative wound, and in the axilla. Firmly adherent nodules were found, varying from one half to one inch in diameter, and extending into the axilla. Small, hard, adherent glands were also found in the supraclavicular region. Active treatment was given for three months, at the end of which time mild dermatitis developed, but the nodules had disappeared, and the patient was free from symptoms. Against my advice she took a trip across the continent, returning at the end of three months with an increased development of the disease, and presenting at this time large adherent masses in the supraclavicular region, resulting in paralysis of the left arm. Under treatment during three months, all evidence of the disease again disappeared. The patient even recovered the use of her left arm. She again interrupted treatment for three months' vacation, the end of which time she returned suffering from excruciating pain in the left axilla and arm, with palsy and atrophy of the muscles, also enlargement of the supraclavicular glands. *X-ray examination showed enlarged mediastinal*

Read before the Seventeenth International Medical Congress, London, August [illegible], 1913.

glands. She was placed under active treatment, which was continued for nine months, at the end of which time she seemed to be well excepting for the atrophy and palsy of the left arm, from which she never recovered. After this she was seen at intervals during the following five years, at the end of which time she died from intestinal disturbances, which may or may not have been part of the primary disease. No autopsy was permitted, but the patient's symptoms were chiefly diarrhoea and exhaustion.

In this case we had to do with the extensive recurrences and metastases which extended even into the mediastinum, yet through the action of the rays this patient was kept alive and fairly comfortable during a period of seven years, during which time she made several trips across the continent, traveled extensively through Europe and was able to carry on her usual duties. The palpable evidence of the disease had disappeared. The palsy and atrophy of the muscles, following the neuritis, caused by the pressure of the glands, did not disappear excepting after the first attack.

CASE 2. Mrs. S., age 45, was referred to me by Dr. Chas. Johnson of Charleston, South Carolina, October 9, 1902. She had had her left breast amputated two years previously. During six months she had been suffering from recurrence in the scar, one and a half inches in diameter, firmly adherent, tender and painful. Active treatment was continued during two years, during which mild dermatitis had been produced several times, but which resulted in complete disappearance of all evidence of the disease. Treatment was then interrupted, and two years later the patient returned with secondary degeneration of the skin, resulting from the radio-dermatitis. This area then covered about one inch in diameter. It was excised and examined microscopically, but not found malignant. She is still living, and apparently well to-day, eleven years after beginning the treatment for the recurrence.

In this case the treatment of the rontgen rays, given even during the early days when technique was poorly developed, resulted in an apparent cure, which has lasted during a period of approximately eleven years. The secondary degeneration resulting from a dermatitis, could probably be avoided by present day technique.

CASE 3. Mrs. C., age 4[illegible], was referred for treatment by Dr. Wm. L. Rodman, July, 1903. She had been operated upon for carcinoma of the breast six months previously and was then suffering from recurrence in the wound, an adherent nodular mass in the axilla, with severe pains radiating down the arm. She was treated actively twice each, for two months at the end of which time she seemed to be well, and was well April, 1909, when last heard from. She received in all fifty-five treatments. All evidence of the disease disappeared and the patient seemed quite well.

CASE 4. Mrs. J. F., age 46, was referred for treatment on May, 1909, by Dr. R. D. Newton. She had had complete operation for advanced carcinoma of the left breast in September, 1909. She had noticed nodules forming in the operative field, beginning about three months before coming to me. At her first visit I found an extensive, nodular infiltration of the entire operative field, hard, adherent glands in the supraclavicular region, swelling of the left arm, general infiltration of the subcutaneous tissue below the axilla, and some infiltration of the opposite breast. It was looked upon by myself and everyone as a hopeless case, but most remarkable result followed. At the end of 48 hours, following two full dose treatments, the diseased tissue had been reduced to one-half. This reduction affected even areas that had not been directly exposed to the rays. Under active daily treatment, the disease progressively disappeared, until no evidence of the disease could be detected. She was shown before the surgeons at the Clinical Congress in November, 1911, at which time, to all outward appearances, she seemed to be well.

Apparently the rough handling that she got over the tissues at this time seemed to excite the disease, for following this demonstration the disease began to grow, spread rapidly and was very little influenced by treatment. This case is very instructive. The fact that extensive subcutaneous infiltration of metastatic carcinoma should show reduction to one-half at the end of 48 hours from the time treatment was begun would suggest that in some way in this case antibodies were produced which assisted in the removal of the disease, for diseased tissue was affected even in areas that were not directly treated.

The fact that the disease continued to disappear until none of it could be palpated and the patient seemed to be physically well, would seem to indicate that this change was brought about through the action of the rays, and careful observation of such results may point the way to a more ideal treatment of the disease. It teaches us that even hopeless cases will sometimes respond to treatment. It teaches also that rough palpation should be avoided in the areas previously involved.

CASE 5. A similar case, and the most extensive carcinoma that I have ever seen, was that of a woman, age 45, who was referred to me by Dr. Radcliff Cheston, December 28, 1909. She had been operated upon for carcinoma of the left breast in September, 1909. When I first saw her she was bedfast, and had an open ulcer the size of her hand over the operative field, with general infiltration of the subcutaneous tissue extending into the left axilla, up to the clavicles, across the sternum, and involving the opposite breast, which was one large mass of carcinoma, extending up to the clavicle on the right side, and into the axilla of the right side. Nodules extended down below the costal border on both sides. The patient suffered from severe pain and sickness.

Under active treatment during five months, the ulcer healed, all the infiltration of the subcutaneous tissue disappeared, and the right breast was reduced to about one-third of its original size. This, however, was still firm and fibrous, though not adherent. At this time she was able to walk, though not strong, and was planning to go away for the summer. Apparently through some indiscretion in diet, she developed diarrhoea, resulting in gaseous accumulation in the intestines, embarrassed respiration, which was followed by hypostatic pneumonia, from which she died on July 31, 1910, or approximately seven months after beginning treatment, and two months after the outward evidence of the disease had disappeared.

The disappearance of so extensive a disease under the influence of the rays certainly proved a most decided effect of the treatment. Whether

the visceral symptoms were secondary to the original disease, or whether it was an intercurrent infection, no one will ever be able to say positively No autopsy was permitted X ray examination shortly before her death showed consolidation of the bases of the lungs, with new involvement of the upper portion, and new involvement of the mediastinum. This fact would seem to indicate that her death was not due to visceral metastases It would seem to indicate that if the disease had been treated a year earlier or immediately after the operation, we would surely have had a right to expect recovery

Case 6 This case is almost identical with the previous case and serves as an illustration of another very extensive carcinoma en cuirasse This patient, Mrs B age 40, was referred by Dr Isaac Leopold June 1 9 Two years previously she had her left breast amputated by Dr Ed and M rtin and a year previously he removed a growth from beneath the right breast. During six months an extensive recurrence had developed and when she was brought f rom mens the entire left side of the chest, extending back to the posterior axillary line and extending across the sternum, involving the entire right breast and extending on the right thi one carcinoma with infiltration, with outlying nodules and with small shining nodules on the surface of the skin Daily X ray treatments were given, and the disease attacked from all sides I am now the the disease had disappeared from the entire surface of the best, but there was extension through the lymph vessels of the subcutaneous tissues on the left side extending to the spinal column covering an area about 6 inches broad Treatment was begun on th 20 December 19 and in weeks the disease had disappeared from the back She was then kept under treatment at irregular until March 9 9 3 Each treatment was interrupted for time and she developed pleuritic effusion on the left side Th filled the best and was later withdrawn, and the pleural cavity infiltrated with oxygen A röntgen examination then made and no evidence of mediastinal or pulmonary metastasis could be found Th fluid has recurred several times in the chest, and we are uncertain whether this is due to malignant infiltration or not

One would think that the röntgen examination would have shown some evidence of the disease if this could have been the cause We are at least certain that very extensive carcinomatous infiltration of the subcutaneous tissues, involving the greater portion of the chest completely disappeared making the patient comfortable and enabling her to li e at least t o years longer than she would ha e otherwise The outcome t present cannot be predicted

Case 7 Mrs B age 56 referred by Dr John B Denver December 9 0, had an operation for removal of the breast three months previously At the time of beginning tre tment there was distinct evidence of recurrence in the axill and supraclavicular region Under active treatment by be ys, there was some reduction in the disease but on April th, Dr Denver still found deep axillary and infraclavicular disease This was associated with swelling of the arm, and pain Treatment was continued until September 9 hen all evidence of the disease had disappeared She then developed an exfoliated dermatitis, involving both the skin and mucous membrane over the entire body Since then she has remained perfectly well, the time now being two years and nine months since beginning treatment for deep recurrence. Her attending physician believed that she also had mediastinal involvement at the beginning of treatment. To-day she seems to be perfectly well.

Case 8. Miss H aged 45 years, referred to me by D William Martin, October 5 911 She had noticed tumor in her right breast several months, which she thought followed bruise (walking into rail) A sister had died from carcinoma of th uterus about a year previously Examination showed tumor in the right breast about half the size of hen's egg, a small palpable gland in the axilla, and barely palpable gland in the right supraclavicular region. In the upper and outer quadrant of the left breast tumor about the size of pigeon egg was palpable She had signs of osteo-arthritis in the cervical and upper dorsal spine She had polypus on the cervix of the uterus

There was some doubt in the diagnosis, therefore I referred her to Dr H. P Wasmuth, who amputated the right breast cleared the axilla, and removed the small gland from the right supraclavicular region and polypus from the uterus. Microscopical examination by Dr Henry S. Wieder showed distinct scirrhous carcinoma.

Within two week after the operation, she had the excruciating pains of carcinoma and within month the entire operative area indurated nd showed distinct recurrence in the wound the axilla and the supraclavicular region, corroborated by Dr W rmuth and myself At the same time the tumor in the left breast increased in size to that of fist, and with enlarged gland in the axilla.

Very active daily treatment as given to the recurrence on the right side until slight dermatitis appeared, then treatment was given to the left breast — which was clearly inoperable under these conditions — and each side was treated in turn until all evidence of the recurrence had disappeared from the right side nd until the left inoperable breast had become soft and all parts freely movable. On the two sides she had had in all one hundred and eighty-six applications of the rays A the end of nine months no distinct evidence of the disease could be recognized She had returned to her social affairs of life as taking gymnastic exercises, and had been quite well since During the early part of January 9 1 she observed the left breast the skin which had been diminished by the rays became eroded and painful I then referred her to Dr Wasmuth for excision of the breast The cells was not opened, because we believed the rays had sealed the glandular area P thological study by Dr Eugene Case confirmed by Dr Joseph McFarland, showed no evidence of malignant disease anywhere, but showed pigmentation and necrosis of the skin and chronic diffuse fibrosis of the breast

The result in this patient seem to be most striking and indisputable The carcinoma of the right breast, with metastasis was thoroughly removed nd upon macroscopical examination proved to be an undoubted case of malignant disease The disease recurred t once and no one doubted the recurrence All this recurrence disappeared under the action of the rays. The disease in the left breast increased rapidly after amputation of the right. No one doubted its

malignant character Under the action of the rays, the clinical signs of the disease disappeared and subsequent amputation of the breast showed neither microscopic nor macroscopic carcinoma.

CASE 9 Mrs W , age 35 referred by Dr E. B. Rogers The patient had had her right breast amputated on account of carcinoma in May 908 At the time of beginning X ray treatment there was induration of the tissues in the upper portion of the scar and extending into the axilla, with enlarged, hard, adherent glands in the right supraclavicular region

The patient was treated three times week, and at the end of six months all evidence of recurrence and metastases had disappeared She remained well until April 17 9 when tumor developed in the left breast. Both sides were then treated actively again, and she has remained well t date, hich is nearly five years since beginning treat ment for metastases and recurrence

CASE Mrs D , age 50, was referred to me by Dr. John B Deaver on December 3 908 She had been operated upon for carcinoma of the left breast on November 7 908 She was given post-operative treatment, and remained well until May 24, 909, when small nodule developed in the upper portion of the scar D Deaver who examined this, believed it to be malignant, and advised excision Active treatment was applied by the rays t this nodule and when she was taken to the hospital three eeks later Dr Deaver could not find the nodule, and refused to operate. She has remained well to date, hich is nearly five years

CASE Mrs H age 50, was referred by Dr John B. Dea er November 9 She had been operated upon for carcinoma of the breast by Dr Deaver in June, 9 She noticed recurrence in September 9 When first seen by me there was tumor the size of half been's egg, at the middle of the scar firmly adherent to the ribs, and Dr Deaver considered her inoperable Under X-ray treatment this has completely disappeared, she has regained perfect health and so far as we can tell she is well

CASE Mrs D age 63 was referred for treatment by Dr J W Schaffer She had had an attempted removal of carcinoma by caustic When this was unsuccessful she had radium pplied, having 48 hours' exposure to radium in all Nothing was done for year during which time the recurrence developed in the breast, in the axilla fold, and in the supraclavicular region When applying for treatment by X-ray she had mass in the left axilla one-half the size of her hand, firmly adherent, hard and painful Under X-ray treatment this has completely disappeared, and to all outward appearances she is well

CASE 3 Mrs E , aged 49 years, was referred to me by the Rev Russell H Conwell July 17 908 She had been operated upon for carcinoma of the left breast five years before, at one of the leading hospitals At that time the tumor was said to be the size of walnut, and as excised Recurrence developed ithin ta years When she came to me the tumor tissue involved the entire mammary region, with axillary and supraclavicular involvement The mass was so large that it left the impression on my mind of an extensive primary growth It as hard painful, adherent nodular mass, ulcerated at several places I was so far advanced that I wrote to Doctor Conwell that I believed nothing would be accomplished In the absence of any other hope I treated her with the rays

In month the mass of tumor tissue was reduced to half and the ulcers were healing In two months it was reduced to third the ulcers ere healed, and in three months no tumor could be palpated There remained, however puckered central scarlike mass of tissue, about one-half inch in diameter which was freely movable, and which was not painful. I believed there was no malignant tissue present, but I feared that later this mass would undergo degeneration and accordingly referred her to Dr W Wayne Babcock for operation, January 18, 909.

I believed that only a local excision was necessary but Dr Babcock did complete operation. P thological examination of th specimen by Dr Duncan showed some evidence of malignant disease She was sent back to me in six eeks, when both Dr Babcock and I felt hard nodule in the supraclavicular region about the size of pea. This was reduced under treatment to one-eighth of an inch and has since remained stationary About year ago hard nodule one-half inch in diameter was discovered in the right axilla. This has decreased in size but has never disappeared At first the patient was treated daily then less often, and during the past three years she has been seen once month for the purpose of keeping her under observation In the four and half years she has had seventy-six applications of the rays. The left mammary area shows marked telangiectases

This woman was clearly inoperable when referred to me for treatment because of the extent of the disease, and seemed hopeless even in my estimation The disease had practically disappeared in three months. The puckered scar was then removed. Her general health improved immediately and during three and one-half years she has felt and looked perfectly well. The fact that the disease was recurrent and metastatic makes the result all the more convincing

CASE 14 Mrs T aged 38 years, referred to me by Dr Samuel Johnston and Dr Ernest Laplace, January 6, 909 Tumors had been noticed in her breasts eight years previously They gradually increased in size and secondary nodules developed under the anterior auxiliary fold.

At the beginning of treatment there was mass, one and half inches in diameter in the lower outer quadrant of the left breast, and one two and half inches in diameter in the upper and outer quadrant, with small nodule under the anterior auxiliary fold Both were hard, nodular and adherent There was similar tumor in the right breast, one and half inches in diameter in th lower outer quadrant She was considered inoperable because of the extent of the disease She was treated three times week at first. During the past three years she had been seen once or twice month, partially for treatment and partially for observation In all she had been treated one hundred and fourteen times The tumors ere reduced t fibrous mass about one-half inch in diameter freely movable, and not tender Her general health had t no time been interfered with, and in general appearance she looked perfectly well

The treatment was carried to the point of producing an erythema, several times, and as result the skin as atrophic and showed number of telangiectases This patient was living and symptomatically ell, over four years after she was referred with carcinoma of both breasts with metastases. She had suffered no inconvenience except that of coming for treatment.

CASE 5. Miss G aged 37 years, as referred to me by Dr John B. Deaver July 4 9 A carcinoma had been growing in the right breast over three ears. In September, 9 0, she was taken to Dr. Dea er by Dr George Miller for operation, but at that time the disease had advanced so far that Dr Deaver considered operation inadvisable. Ten months later hen the carcinoma had become an ulcerating mass she was taken to Dr

Dea er again, t hich time he referred her t me. She then had an ulcerating tumor about four inches in diameter adherent to skin and be ath several small metastatic nodules about the tumor There were enlarged glands in the axilla and the supraclavicular region She suffered from severe pain

Under treatment the ulcer gradually healed, the tumor tissue disappeared, and even the scar tissue became movable upon the chest wall. There was no definite evidence of disease in this area for about yea (I these patients, it is difficult t decide just hen the disease has all disappeared)

About M y 9 tumor developed in the upper and outer quadra t of the left breast She as seen t D Deaver May 8 9 to ha him see the result in the right breast, and to confirm the diagnosis of carcinoma in the left breast The tum l the left breast had nearly disappeared, and in its place wa some soft firm tissue hich I believed, was due t fibrous tissue She had two hundred and six pplications f the ray in 1, counting both side

During all thi treatment she improved in general health, pains ere relieved and she increased in weight nd strength There were of course some trophy and telangiectases of the skin on the right side After two or three yea this is likely to degenerat and become necrotic If so, and there is no can r ma present ex sion and skin grafting should be done

This patient was clearly inoper ble because of the extent of the disease The disappearance of this d anced disease in the right brea t under the action of the rays gave encouragement toward further effort when igns of carcinoma developed in the opposite breast nearly a year later The relief of the symptoms in the second brea t shows that good results may at times be obtained even in a patient with a pronounced con titutional tendency

TECHNIQUE

The technique of the application of the rontgen rays in my experience in the treatment of the metastatic and recurrent carcinoma upon which this paper is based has, of course passed through the arious stages of the development of rontgen therapeutic technique from the very small and superficial doses, often repeated and unfiltered, to the present larger doses of filtered rays applied less frequ tly but more thoroughly and from as many directions as possible. Therefore as would be expected, good results ar more frequent at present than formerly

1 A thorough examination of the patient is necessary to determine the tent of the disease. This will require careful inspection and palpation of the entire chest and glandular regions, and generally a rontgen examination of the chest.

2 Having determined the extent of the disease, the skin is di ided t s many area as possible, through which the rays may be directed to the deepest area of disease. This division should not be so much subdi ided as to waste energy Generally I apply the rays from four or five different directions, the anterior axillary and mammary the posterior axillary and scapular the axillary and the supraclavicular In this way the deeper portions of the disease, especially the mediastinal glands, are reached by each application The areas of skin not directly exposed should be protected by layers of lead foil, or some opaque material.

3. The exposed kin should be protected by filters. For this I originally depended upon leather one-eighth of an inch thick (first recommended by me before the American Röntgen Ray Society September 1905) which I found ga e considerable protection. To this I now add from one to four millimeters of aluminum. These filters are placed about one-half inch from the surface of the t be and bet een the tube and the patient. I this w y the filters never touch the patient and are never soiled. In my apparatus they occupy the top of the d iphragm of the protected tube holder

4 The quality of rays should be sufficiently penetrating to carry a good proportion to the deepest part of the disease, and should be from 6 to 8 a measured by the Benoist scale. Great difficulty is usually encountered in keeping the rays emitted by the tube of a uniform quality For this, I have found the water-cooled tubes most efficient, when kept uniformly cooled by a constant stream of water flowing through the cooling chamber

5. The dose should be carefully measured and the erythema limit should not be exceeded. For this purpose the Sabouraud pastilles ha e served me best. The treatment should be carried to this limit as quickly a possible in each area. After the erythema dose has been gone over any particular area treatment should not be repeated at that point for at least two weeks The interval during which one should wait will ha t be increased ith each repetition

CONCLUSIONS

I ha selected for study the bove fifteen cases because they ere rather striking examples of what ca be t times accomplished and it would seem t me that w ca draw the following conclusions

That the application of the rontgen rays will t times cause disappearance of both small and extensive areas of both ecurrent and metastatic carcinoma

Cases 6 [illegible] and 7 have been previously referred to in a report upon Inoperable Carcinoma of the Breast [illegible] M y 1 Apnl 1

2. That the disease can at times be made to disappear when it covers the greater portion of the chest.

3 In at least one case there seemed to be produced some constitutional condition which led to the rapid disappearance of carcinomatous tissue that had not even been exposed to the rays.

4 The additional administration of thyroid extract in small doses seems to aid materially in the cure of the disease.

5. The disease should be treated as actively and with as large doses as circumstances will permit, using every possible means for the protection of the skin

6 Since the above cases prove that extensive recurrent malignant disease can be made to disappear the best time to treat with the rays is immediately after operation when least disease is present. This post-operative treatment should be thorough and given with the same care that would be used with palpable disease.

HÆMOSTASIS IN CRANIAL SURGERY

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NO single factor in the technique of neurological surgery particularly that involved in exposing the brain is more important than the proper and efficient control of hemorrhage. The extreme and peculiarly constituted vascularity of the scalp, the presence of the emissary enous sinuses varying in their size and position, the large vascular lacunæ in the diploë the vessels entering the skull through their bony canals for the supply of internal structures, and lastly the delicate and intricate network of vessels incorporated in the meninges, all present varying and trying problems to the surgeon and are a source of constant danger to the patient.

Unless the armamentarium of the surgeon contains the proper mechanical agents and unless he has the experience and judgment to cope with this troublesome phase, the often alarmingly profuse hemorrhage will be a constant source of annoyance during the operation and a menace to the life of the patient, for whom the prognosis would otherwise be good.

It is the purpose of this paper to review those measures which have been found most efficacious by those having the largest experience in cranial work and to describe the tourniquet which I devised and had made for the use of Dr Charles H. Frazier in his service at the University Hospital

The exceedingly free blood supply of the scalp renders control of hemorrhage much more difficult than elsewhere on the body surface. This is due not only to their number and free anastomosis but to the peculiar anatomical arrangement of the blood-vessels in the tissues. Five large trunks enter the scalp on each side, the frontal and supra-orbital in front, the superficial temporal and posterior auricular laterally while posteriorly the large occipital artery approaches between the borders of the sternomastoid and trapezius muscles. These vessels break up into an enormous number of branches which anastomose with one another and with their fellows of the opposite side in a remarkable manner

The venous return is even more complicated, as the free communication between the veins and the diploic circulation renders hemorrhage from this source quite as profuse and difficult to control as that from the arterial side.

The skin of the scalp is one of the densest in the body In its deeper layers and in the tough unyielding fascia which binds it to the aponeurotic layer beneath, is the major portion of the blood-vessels. The tough surrounding tissue not only prevents contraction and retraction of their cut ends, but makes grasping the severed vessels with ordinary hemostats and ligation usually impossible.

The vascularity of the other layers of the scalp is very meager and presents no difficulty in its control.

Control of the superficial hemorrhage This is a much simpler matter in those operations on the vault than in those at or near the base of the skull. Among the latter may be mentioned operations for exposure of the gasserian ganglion, subtemporal decompression, the MacArthur Frazier route to the pituitary and exposure of the cerebellum.

The posture of the patient has a distinct effect upon the freedom of the hemorrhage. The semi-sitting posture at an angle from 45° to 60° is not

only a definite controlling factor in the bleeding but offers the most advantageous position for the convenience of the surgeon in exposing the deeper structures. This position can always be obtained except in those procedures on the posterior fossa where the patient must be placed face downward. Here a specially constructed table which will allow elevation of the head without displacement of the field of operation to an inconvenient height is of advantage. Of course, with the patients in these positions, a constant record of blood pressure is essential. If this falls to a dangerous level, the more nearly horizontal position is immediately assumed. It is always interesting to note the almost immediate effect this change in position has upon the venous bleeding from the wound.

The state of and the nicety in the administration of the anesthetic will also greatly aid or delay the surgeon in the control of bleeding. A half-anesthetized, cyanotic patient or one whose respiratory passages are constantly filled with mucus is always a menace the resulting intense congestion of the veins often causing furious hemorrhage. The use of the intratracheal or the intrapharyngeal insufflation methods of anesthesia has greatly facilitated the nicety and the uniformity with which the patient is kept under the influence of ether

The most convenient means of controlling scalp hemorrhage in those operations where it is applicable, i.e. those on the vault, not at or near the base, is some form of encircling tourniquet. There have been many devices for this purpose rubber tubing, a modified Petit's tourniquet, and pneumatic tube incased in metal jackets on the outside, by the inflation of which the desired pressure could be obtained. They are, however all more or less cumbersome, difficult to apply maintain in position and remove, while the presence of rubber in their construction renders them very short-lived when frequently sterilized as is necessary

To overcome these disadvantages and to obtain an instrument consisting entirely of metal, our tourniquet was devised. It consists of a thin flexible spring-steel encircling band, 14 mm. wide and about the thickness of the ordinary steel tape measure. It is broken fore and aft. Posteriorly there is a sliding joint controlled by a strong coiled spring. This spring in no wise measures the amount of pressure exerted by the band, as the friction between the band and the gauze covering the head prevents slipping of the tourniquet and hence strain upon the spring during any safe constriction. Its action, then, is simply that of a safety valve. Anteriorly is the self-locking lever ratchet by which the band is tightened to any desired pressure. Laterally there are two sliding adjustable auxiliary springs which lie over the temporal fossæ for added pressure over and control of the temporal arteries. There is also a detachable and adjustable steel band which passes from the midline in front along the line of the longitudinal sinus to a like point in the rear and prevents displacement of the tourniquet downward. When the instrument is properly applied, however, with adequate pressure, the use of this strap will seldom be necessary

To apply the tourniquet, the head is covered with three or four layers of sterile dressing gauze, the band, previously sterilized, is slipped over the head until it rests on a line passing just above the ears from the glabella in front to just below the inion behind. The temporal springs are now slid to their proper positions and the slack taken up through the sliding joint in front. The hook of the lever is now inserted into one of the catches, three or four holes from the midline, and the lever snapped shut, which draws the band tight. After a little experience, one can accurately estimate the amount of constriction necessary for hemostasis by the force required to shut the lever

When it is desired to remove the tourniquet the lever is raised, the band springs open and it is lifted from the head. The instrument being entirely of metal is practically indestructible, can always be sterile and may be readjusted, tightened or loosened to any desired pressure or removed at any time during the operation with ease and without fear of contamination. Caution should be taken that this or any other tourniquet is applied with sufficient pressure to occlude all the arteries, else it will be worse than useless by shutting off the venous return only causing intense congestion and greatly increasing the hemorrhage.

There is at least one condition which also renders the use of a tourniquet disadvantageous. In some cases of large cortical cerebral tumors, the normal communications between the internal veins and sinuses of the skull and those in the scalp is so greatly exaggerated that occlusion of the latter only increases the flow of blood from the scalp wound. This is particularly liable to happen when the tumor is of the very vascular and malignant type Here recourse for control of hemorrhage must be had to digital pressure by an assistant to either side of the wound until the bleeding points may be caught, or better the edges of the scalp grasped by some one of the forms of scalp clamps Of these clamps there are many but the Allis hemostat serves every pur



Fig Showing sitting posture anterior view of tourniquet applied, showing the self locking catch in front.



Fig Illustration showing proper position of patient lateral view of tourniquet applied, adjustable headrest, and nitrapharyngeal method of anæsthesia. Note the additional pressure over the temporal arteries.

pose, is quickly and easily applied, and there is not the danger of injurious traumatism to the tissues as with some of the other models. In some of these cases the loss of blood may be so great, even before the dura is exposed, as to necessitate postponement of the operation to a second sitting In some the question of ligation of one or even both carotid arteries may be considered This is not often necessary however and when done should be by means of a temporary ligature or metal clamp which should be removed or partly released upon the development of any signs of deficient cortical circulation sufficient to cause motor or sensory disturbances

It is seldom that ligature need be applied to the scalp wound the tourniquet or the hæmostats are left on until the end of the operation, are then removed and the wound closed with deep interrupted sutures of silk orm gut the sutures passing beneath each bleeding point, when tied will usually sufficiently control all bleeding

There are many other methods of controlling scalp hæmorrhage among which may be mentioned the hæmostatic safety pins of Horschutz, Kredel hæmostatic sutures, the clamps of Hudson and Tate, and deep backstitch running sutures circumventing the wound All are of use in those procedures not permitting the use of the tourniquet the backstitch especially in suboccipital craniectomies where it is run along the line of the superior occipital ridge from one mastoid process to the other The suture is carried down to the bone each stitch overlapping the other about half and drawn sufficiently tight to occlude the vessels.

Control of the deeper hæmorrhage The superficial bleeding having been controlled the surgeon is next met with hæmorrhage from the bone. This occurs from several sources, the emissary veins and sinuses which may be greatly increased in number and size the diploic veins, or from the middle meningeal artery when the field of operation includes the sphenoparietal region Bleeding from the emissary veins is seldom difficult to control often ceases spontaneously or their orifices are plugged with Horsley's wax Certain of these channels should, however be borne in mind, when operating in the occipital region. There are usually two or three large foramina, chief of which is the mastoid, lying one and a half to three centimeters inside the mastoid process, and which communicate internally with the lateral and sigmoid sinuses and externally with the occipital

veins. There are also several nearer the midline which spring from the occipital sinus. Hemorrhage from these sources may be shockingly profuse in a very short time sufficient to endanger the life of the patient if not controlled but this is usually easily done with wax, although plugging with wood or bone pegs may be necessary

Bleeding from the diploe is usually of no moment the use of the Cryer spiral osteotome for cutting out the osteoplastic flap aids greatly in its control both by the heat of friction and the plugging of the sinuses with the fine bone dust

In some procedures where the dura has to be raised from the base of the skull for exposure of deeper structures one may encounter some hemorrhage from the torn dural vessels entering the inner aspect of the bone As a rule however this is very slight, although in the older operation of gasserectomy it was often severe when the ganglion was raised This danger and that of injuring the cavernous sinus has been practically eliminated by the Spiller Frazier method of avulsion of the sensory root. In this operation the only bleeding of moment comes from the middle meningeal This artery is deliberately cut as it enters the skull through the foramen spinosum and the foramen immediately occluded with Horsley wax. This is usually sufficient but if not, its orifice may be plugged with a wood peg conveniently whittled from a swab stick.

Bleeding from the external surface of the dura itself is seldom serious in quantity but may be very persistent. The larger vessels are ligated with the finest silk the ligature carried around the bleeding vessel on a fine curved needle Care should be taken while doing this not to wound any of the underlying pial vessel Other persistent points of bleeding in the dura are stopped by the application of bits of gauze or cotton wrung out of boiling saline solution or by the application to the point of bit of muscle tissue easily snipped from some of the exposed muscles This latter method, whose action is physiological was first used by Sir Victor Horsley for this purpose and is most satisfactory The muscular graft is not removed but closed in the wound

It is seldom necessary to encroach upon the larger sinuses of the dura As a matter of caution however mention should be made of the deviation of the superior longitudinal sinus toward the right as it passes backward. Posteriorly therefore operations can be carried further toward the midline on the left side than on the right In the parietal regions also it should be borne in mind that the pacchionian bodies are not only more numerous but are farther from the midline and are surrounded by large sacular lacunæ offshoots of the longitudinal sinus. If these should be wounded accidentally the application of muscle grafts and inaction — unless the hemorrhage be dangerous—is the best policy the bleeding often ceasing spontaneously if the dura is not pressed away from the bone If more vigorous means are indicated the overlying bone must be rongeured away and the sinus ligated on either side of the rent with fine silk.

The greatest care should be taken to avoid hemorrhage from the pial vessels. The dura is opened along a grooved director and the manipulations of the cortex must be most delicate. If deeper exploration of the brain be indicated, the overlying pial vessels are ligated on either side of the proposed wound. For this the very finest silk mounted on a fine curved needle is employed. Serious hemorrhage from this source is usually the result of bungling or harshness. It may however be unavoidable and very profuse in those cases of cortical tumors of a malignant type which are on or near the surface Heat by means of the hot saline solution in cotton and also muscular tissue is of use here as in the dural bleeding

Notwithstanding all the care and precautions that may be taken, hemostasis at the end of any cranial operation is seldom perfect and it often becomes necessary to institute drainage for the first few hours following the operation. For this purpose strips of rubber tissue are the best. In more profuse bleeding, a small rubber tube may be used or strips of gauze. When the latter is used, it should be wrung out of sterile liquid petrolatum which prevents adherence of the gauze to the tissues and recurrence of the bleeding when the drainage is removed Usually the drain should be brought out through a counter opening at the lowest angle of the wound it should never be left in over twenty-four hours and is preferably removed in from fifteen to eighteen the opening then covered with a wisp of cotton moistened with 5 per cent iodine solution When the condition of the patients warrant, they are always placed in bed in the sitting posture as soon as they are out of ether This greatly assists in the prevention of or the continuance of hemorrhage

For knowledge in the practical application and use of these methods of hemostasis, I am greatly indebted to Dr Charles H Frazier whom it has been my privilege to assist in a considerable number of these cases

FRACTURE OF THE LOWER ENDS OF THE TIBIA AND FIBULA

By V. R. COLVIN, M.D., St. Paul, Minnesota

My excuse for bringing so familiar a subject before you is that I am convinced that the classifying of nearly all of these injuries as Pott's fractures has led to confusion in treatment. The surgeons of preradiographic days were undoubtedly possessed of a high order of clinical observation, but the more one sees of radiographs of injuries in this region, the more one speculates as to the amount of error there must have been in the interpretation of clinical pictures, by even expert clinicians.

In Treves' Surgery, for instance, it is stated that Pott's fracture is the most frequent of all fractures at the lower end of the leg.

The radiographic study of fractures, while widening our possibilities of clinical interpretation, also convinces us of the impossibility of arriving at clinical conclusions under certain conditions, unless such a conclusion should be that we cannot know.

The fact that the best clinical powers are bound to err furnishes an explanation why the fractures under discussion, being so freely interpreted as Pott's fracture and treated accordingly, should inevitably lead to bad results.

That the end-results of treatment are not satisfactory in a large number of cases is evident, when one reads a report of any considerable number of fractures.

Malmeus says that the result is far from satisfactory in fully one third of the cases.

The failure to treat Pott's fracture by the approved method is as serious an error as it is to treat a variety of lesions by this method.

Pott's description of the fracture which bears his name was a fracture of the fibula, about three inches above the ankle joint, combined with a rupture of the internal lateral ligament (Fig. 1).

Dennis' System of Surgery, Treves' System of Surgery and Agnew's Surgery are the only works in English where I have found the original description adhered to. Nearly all other authors, while agreeing that it is unsafe to lump all these injuries under one heading, nevertheless illustrate with radiographic reproductions various injuries as Pott's fractures, and then, with few exceptions, emphasize the inappropriateness of treatment.

My own observations and perusal of illustrated literature on this subject convinces me that Pott's fracture, in the strict sense, is a rare injury.

Meissner[1] reporting 211 cases of injury to the lower end of the tibia and fibula, in the Klinik of von Bruns, occurring since the advent of the radiograph, classifies them as follows:

		No. Cases
Fracture of —		
	The external malleolus, or of the fibula above the joint	5
	The internal malleolus	7
3	Both malleoli	100
4	Supramalleolar	39
5	Epiphyseal separation	
6	Tibial articular surface	3
	Total	

Meissner says that in pronation fractures he frequently saw a tearing, partial or complete, of the internal lateral ligament, with fracture of the external malleolus.

In a series of 60 cases occurring in the City and County Hospital, Saint Paul, in the services of all the attending surgeons, the lesions were as follows:

		No. Cases
	Fracture of the external malleolus, or of the fibula above the joint	6
	Fracture of the internal malleolus alone	4
3	Fracture of both malleoli	27
4	Fracture of internal malleolus, and of the fibula above the joint combined with backward dislocation of the foot	3
5	Fracture of the internal malleolus, and splitting off of a considerable triangle of bone from the tibia at the tibio-fibular junction	
6	Split fracture of the tibia, at the tibio-fibular junction, of minor degree, with no separation (no other fracture)	
7	Comminution of the articular surface of the tibia	
8	Supramalleolar fracture	6
9	Fracture of the fibula and rupture of the internal lateral ligament	

In the bimalleolar fractures there were two backward dislocations of the foot, one outward dislocation of the foot, one case with splitting off of the anterior margin of the articular process of the tibia, and one of the posterior margin of the same process.

It will thus be seen that in my list of sixty cases, Pott's fracture, in the semi-strict sense, occurred only once. However, if we allow a tearing off of a liberal amount of the internal malleolus to come within the definition of Pott, this did occur in a number of cases.

[1] Deutsche Zeitschr. f. Chir., xxx.

Amer. Jour. Surg., Chir., Gyn.

Read before the St. Louis Medical Society, March 19, 1917.

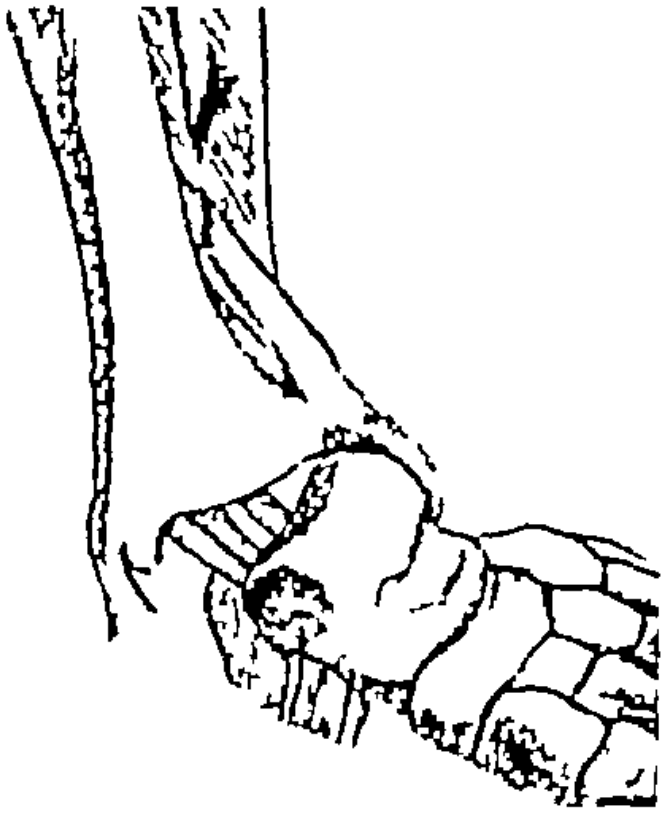


Fig. Pott fracture diagrammatic



Fig. Amputation of the ankle joint showing the foot suspended from the malleoli by the lateral ligaments. It can be readily seen how fracture through the malleoli will result by adduction and inversion to take place at the seat of the fracture

Displacement of the astragalus that is, of its upper lateral edge between the fibula and tibia, I did not see in my list of cases, except in a small number of bimalleolar fracture. Fracture of the fibula above the joint, combined with displacement of the upper lateral edge of the astragalus between the fibula and tibia as a result of a tear fracture is spoken of as Dupuytren fracture.

While conscious of the evils that may result from a failure to recognize and reduce the ankle dislocations of the foot complicating the injuries



Fig. 3



Fig. 4



Fig. 5.

Fig. 3. The deformity caused by treating bimalleolar fracture in the adducted position.

Fig. 4. Fracture of the fibula, at the tibiofibular junction, and tearing of the external lateral ligament with displacement of the foot outwards.

Fig. 5. Bimalleolar fracture with the external malleolus broken in places showing also the eversion or abduction deformity due to mis-correction of the displacement.

under discussion it is my main purpose to call attention to the necessity for maintained adduction as a retention dressing in the true Pott's fracture and to the evils resulting from maintained adduction as a retention dressing in other commoner fractures.

It may be well to recall the fact that there is practically no movement in abduction or adduction at the ankle-joint, these movements taking place in the mediotarsal and subastragaloid joints. Adduction is always accompanied by inversion or supination and abduction by eversion or pronation of the foot. The foot is connected with the malleoli by the powerful lateral ligaments of the ankle joint (Fig. 2).

In the true Pott's fracture the foot has lost its anchorage to the internal malleolus, either by rupture of the internal lateral ligament or if we will the tip of the internal malleolus, and a marked outward displacement of the foot is produced (Figs. and 4).

Inasmuch as the internal lateral or deltoid ligament extends from the internal malleolus to the os calcis and scaphoid bone as well as to the astragalus, marked adduction must be maintained, after reducing the deformity thus approximating the torn structures on the inner side of the foot during healing.

If we recognize Dupuytren's fracture as a separate lesion then adduction is indicated here for the purpose mentioned, and also to hold in apposition the lower tibiofibular separation. If this position is not maintained we get in Pott's fracture a lengthening of the internal lateral ligament, and when weight bearing is resumed, a resulting pronated foot which is the weakest position of the foot and a very disabling one. Even after weight bearing is resumed it is well to have the inner side of the shoe raised, to still throw the tension on the structures at the outer side of the ankle and relieve the tension of those on the inner side. Marked adduction in this fracture cannot do any harm, because the fracture of the fibula is above the tibiofibular joint, and the upper end of the lower fragment being anchored to the tibia by the interosseous membrane, any inward tilting of the external malleolus is impossible, without tearing the interosseous membrane. Adduction, moreover will have a tendency

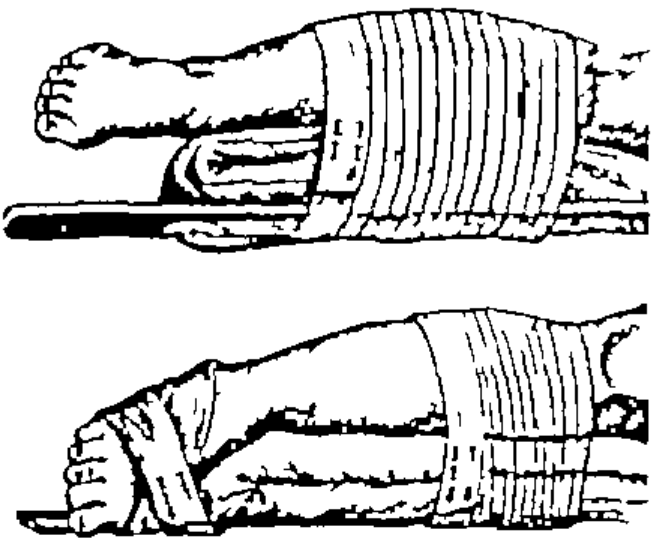


Fig. 6. Dupuytren splint commonly used for Pott fracture — the use of this splint in malleolar fractures could surely cause deformity — it is indicated in true Pott fracture.

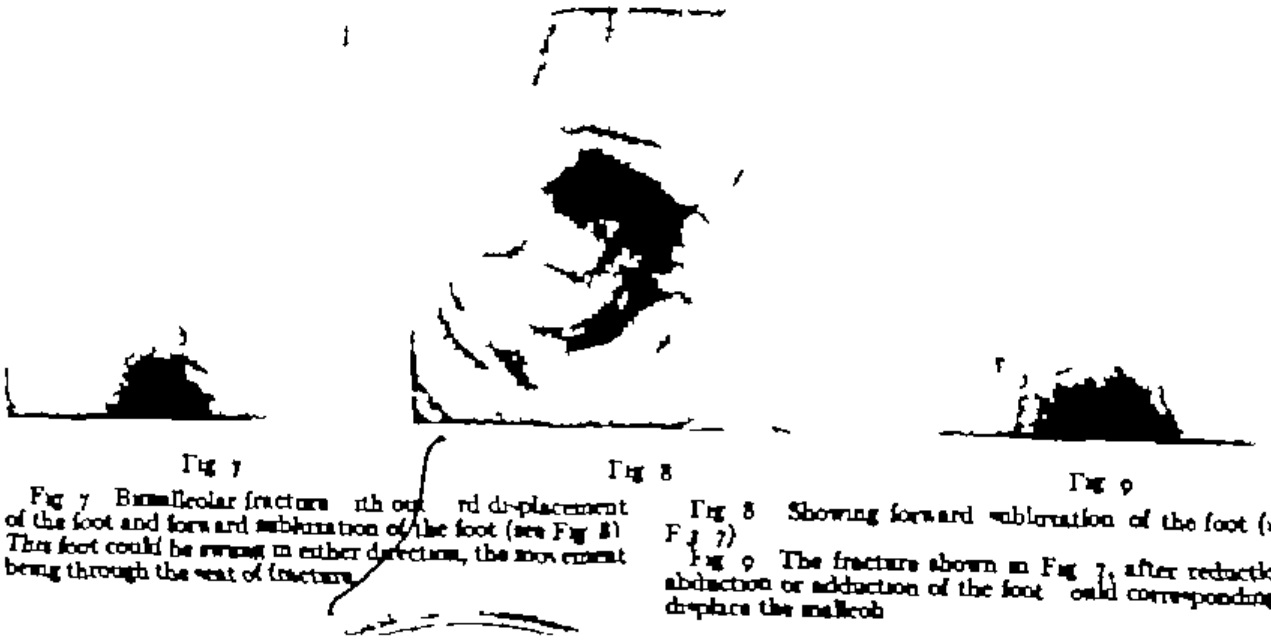


Fig. 7

Fig. 8

Fig. 9

Fig. 7. Bimalleolar fracture with outward displacement of the foot and forward subluxation of the foot (see Fig. 8). This foot could be swung in either direction, the movement being through the seat of fracture.

Fig. 8. Showing forward subluxation of the foot (see Fig. 7).

Fig. 9. The fracture shown in Fig. 7, after reduction, abduction or adduction of the foot could correspondingly displace the malleoli.

through the pull on the fibular tip to draw the upper end of the lower fragment outward away from the tibia whence it has been thrust by the original abducting force.

If the inward displacement of the upper end of the lower fragment is difficult of dislodgment, it might be caught by a pair of tenaculum forceps, and thus drawn outwards.

According to the two lists herein referred to fracture of both malleoli at the level of the tibiofibular junction is by far the most frequent injury and it is in this lesion that forcible adduction can do the most harm (Fig. 3).

Moderate adduction of the foot, or such adduction as takes place normally in the joints referred to above does not have any corrective action upon displaced malleoli. It is only after the normal limit is reached that a continuance of the force will pull, or as it were, rotate the fragments into position. Frequently this can be accomplished more accurately by shoving, rather than rotating.

There should be a distinct understanding in speaking of adduction, in the treatment of these fractures, as to whether it is used as a corrective force, or whether after correction of displacement, adduction within the limits of the joints concerned in this movement is maintained.

The main ligamentous attachments of the foot to the leg being by the two lateral ligaments in bimalleolar fractures, the foot will be hung as by hinges, at the seat of the breaks, and eversion of any forcible kind will swing the malleolar fragments inward (Figs. 2 and 3). Consequently accurate replacement of the fragments, and retention with the foot at a right angle without any lateral or medial deviation is imperative (Figs. 7, 8 and 9).

If the injured member is seen after swelling has taken place, it is very difficult to differentiate the various lesions of this region. With many of them, a dislocation of the foot is possible, and comparatively frequent and easy of reduction.

With the exception of the types with comminution of the articular surface of the tibia or a splitting off of the anterior or posterior lip of the articular surface of the bone reduction is usually easy and if correct, and if proper retention is maintained the result is in the majority of cases satisfactory. With comminution of the articular surface, it is impossible to be sure that the fragments have been properly replaced, except by operative measures. Whether this is necessary must be decided in each case by the amount of disability likely to occur. Where the anterior or posterior lips of the tibial articular surface are split off and displaced reduction of the fragments has been impossible in my hands. The foot, however can usually be brought to a right angle with the leg, and I have waited for some months before deciding whether it was necessary to remove a piece of bone obstructing dorsal flexion, for in some of them the result has been quite satisfactory without such removal.

SUMMARY

1. The lesions occurring at the lower end of the tibia and fibula are very varied in character usually requiring the radiograph for differentiation, and as a guide to treatment.

2. Pott's fracture as he described it, is very rare.

3. The most frequent lesion is a bimalleolar fracture, and the commonest deformity is that of the everted foot.

4. The various lesions are produced by a predominating everting or inverting force.

5. These forces used as corrective measures in either direction may result in the production of a deformity the opposite to the one caused in the original injury.

6. Adduction or inversion of the foot is not necessary as a retention dressing, except in Pott's fracture and if used in bimalleolar fractures is very liable to result in deformity.

7. The original inverting or everting force which fractured one or both malleoli may have spent itself before displacement of the malleoli has occurred, and any subsequent force applied in either direction will cause an eversion or inversion deformity.

Honor should be done to Pott by limiting the use of his name to the fracture which he accurately described, and as radiographic observation proves that this is a rare fracture it is all the more honor to him that he recognized in the preradiographic days this rare lesion.

AN IMPROVED METHOD OF HÆMOSTASIS IN SHOULDER AND HIP JOINT AMPUTATIONS[1]

By WALTER A. NORTON, M.D., S[illegible]

MANY attempts have been made in the past to control hæmorrhage in shoulder and hip joint amputation. It is a subject the study of which is both interesting and useful, and according to the late Nicholas Senn, we must be free to admit that it constitutes by no means a closed chapter. A mastery of the technique of hæmostasis is an essential prerequisite to successful surgery. The presence of blood in a wound not only retards ideal healing but also interferes with speedy work. Extravasated blood is a dead substance and must be so regarded by the surgeon. It is therefore incumbent upon every surgeon to adopt the simplest method for making all operative fields as bloodless as possible. It might be well to delve into the history of these subjects and note the various steps which have led up to the present methods.

The first hip joint amputation performed in America and the first successful one in the world was done by Brashear of Bardstown, Kentucky, in 1806. He amputated the thigh of a colored boy in the lower third and then enucleated the femur through a long external incision.

Bloodless amputations of the shoulder and hip were first attempted by making compression upon the aorta near its bifurcation. Pressure was exerted upon the abdomen [illegible] the vessel being interposed between the wall and the spine. Tourniquets for the purpose were devised by Esmarch, Tiemann, Lister and others, but the method was soon abandoned because of the [illegible] Later in hip joint amputation [illegible] sought to control hæmorrhage by introducing a [illegible] into the rectum and directing pressure upon the common iliac. The [illegible] by [illegible] were as follows:

[illegible]

factory, and preliminary ligation of the common femoral or external iliac for hip-joint and subclavian or axillary for shoulder joint was advocated, but not until the surgical genius of Esmarch introduced the elastic bandage was any decided advance made in this line. Following the general use of the Esmarch bandage Jordan Lloyd advocated controlling hip-joint hæmorrhage by compressing a calico roller bandage over the external iliac, retaining it in position by pinning it to a black india rubber bandage two yards long. The center of this bandage rested between the tuberosity of the ischium and the anus, and the ends drawn tight were held by an assistant at a point corresponding to the center of the iliac crest of the side to be operated upon. Finally in 1889, Wyeth devised a bloodless operation for amputation at the shoulder by elastic constriction over the scapula and pectoral region, and at this operation the applicability of this same idea to hip-joint amputations occurred to him, and in less than a year he performed his first bloodless amputation at the hip. He advocated, as you all know, the use of ordinary mattress needles ten inches long, introduced in the following manner:

For the shoulder the first needle was introduced at the middle of the anterior axillary fold and brought out an inch external to the tip of the acromion process. The other entered at the middle of the posterior axillary fold and emerged an inch external to tip of the acromion process. For the hip-joint amputation the first needle was introduced one-fourth of an inch below the anterior superior spine of the ilium and traversed the tissues for three inches emerging on the outer side of the hip, direction being at right angles to plane of body. The second needle was thrust through the skin and tendon of origin of adductor longus half an inch below crotch and emerging an inch below the tuberosity of the ischium.

This method of Wyeth seemed to solve the problem and has since been in general use in this country [illegible]

[illegible]





1 Ordinary compression of Esmarch bandage around shoulder without the use of Wyeth's needles, or some other method which will hold the tourniquet absolutely in position is not at all certain, because the rubber tourniquet will invariably slip down into the groove below the acromion process and cause such pressure as to greatly interfere with disarticulation.

2 It will also cause diminished pressure by slipping and give rise to embarrassing hemorrhage after the operation is well under way

3. In any of the accepted methods of operation either in the deltoid U flap, anterior racquet or double flap, place the ligature below the origin of posterior circumflex in tying the axillary for this vessel furnishes nourishment for the flap, which if destroyed might seriously impair its vitality

4. Allow no air to enter the axillary vein when tying as it may give rise to air embolism.

5 In all methods, skin incision should be made and dissected up slightly before carrying incision through muscles.

Finally many text-books will tell us that the safest and best way to control hemorrhage in shoulder joints, as well as in hip-joint amputations, is to employ Wyeth needles By a much simpler method we can perfectly control hemorrhage in shoulder and hip-joint amputations, as I have proved in several amputations done by me within the past eighteen months.

[illegible]

Only within the past two weeks, and since this paper was first written have I found in Binney's Surgery 1913 edition, the barest mention of a slightly similar method advocated for use in shoulder joint amputation only

It seems almost incredible that the old method of Wyeth s needles is still recommended in the latest text-books, when a simpler and less barbarous procedure will accomplish the same result. Thinking it may prove useful I will explain a method which can be used absolutely without an assistant if desired, and will control hæmorrhage at the hip as well as at the shoulder It is as follows

A four inch roller bandage and an Esmarch rubber tourniquet is all that is needed. The four inch bandage is made into a 3 or 4 ply strip two yards long and laid upon the chest extending over the shoulder another similar strip is held over the scapula the Esmarch tourniquet is applied over these two strips and pinned to each one with safety pins. The strips are simply folded back and handed to the nurse, or can be tied under the opposite arm.

For hip-joint amputation an anterior strip of bandage is placed so that the outer border of the bandage touches the anterior superior spine of ilium and the posterior one is placed so that the inner border of the bandage touches the tuberosity of ischium Pull is exerted so as to keep the Esmarch snug in the crotch and in the groove below the anterior superior spine of the ilium. The bandage pulleys are now passed over the shoulder of the other side and handed to the nurse or better still tied securely

Many neoplasms, angioma, fibroma, sarcoma carcinoma and keloid, occur in the shoulder It is the most frequent site of lipoma.[1]

I maintain that in the above mentioned conditions this method is superior to Wyeth s needles or preliminary ligations for obvious reasons.

The advantages of this method are,

1 You always have a bandage at hand, and may not have Wyeth s needles

2 You do not impair already lacerated tissues by introducing the needles, for these cases are nearly all traumatic and you are often sorely taxed to find tissue for a flap.

3. The assistant holding the bandage (if they be not tied) can exert pull above or below as you progress with your work and occasion demands

4. By this method you do not open up fresh fields for infection, as you frequently have conditions that make asepsis difficult and as you must necessarily do in introducing Wyeth s needles.

5 Any procedure which will shorten the time of operation, and thereby lessen shock is desirable, and precision in planning little details which will contribute toward making surgery an exact procedure should be carried out.

[1] Bryant and Buck's Surgery [2] System of Surgery Pentzoldt, Vol. III.

A NEW DIAGNOSTIC SIGN IN INJURIES OF THE ABDOMINAL VISCERA

By E. B CLAYBROOK M.D Cumberland Maryland

THERE is no condition that the physician is called upon to face that calls for better judgment or causes him more anxiety than those cases in which there is ground for the suspicion of internal injury In these cases the surgeon is often at a loss to decide whether the conditions warrant an immediate laparotomy or a policy of watching and waiting

In my experience in this class of cases I feel that if we wait for the classical symptoms to appear the patient will be in such shape when operated upon that recovery will be the exception rather than the rule. Anything that can be brought forward to aid us in deciding this question will be of inestimable benefit to these unfortunate patients and a source of much gratification to the surgeon

In a paper read at the one hundred and sixth annual meeting of the Medical and Chirurgical Faculty of Maryland, in 1904 entitled Rupture of the bowel without external evidence of injury with report of a case " I called attention to a symptom noted in that case as very prominent and noticeable. It consisted in the transmission of the heart and respiratory sounds, so that they could be heard all over the abdomen almost as well as over the chest. The ear was all that was needed to elicit the symptom and if it was of any

Read at the seventy fourth annual meeting B and O Association Railway Surgeons Asheville N. C. June 14 15

special value it was doubly valuable on that account, for often the very life of these patients depends upon the attitude of the doctor who first sees them. At that time I stated that I did not know the mechanics that entered into the production of the sign its value, or its significance.

In the past nine years I have looked for this sign, in all cases coming under my care in which there was the slightest chance of an internal injury. After following these cases up closely I have come to the conclusion that the sign is, when present, a positive indication for immediate laparotomy whether the other signs present indicate grave trouble or not. It is present soon after the reception of the injury and has been noted as early as a half hour after the reception of the injury. It continues in unoperated cases as long as twenty-four hours after injury to my personal knowledge and may last for days.

I believe that it is due to the irritation of the parietal peritoneum by the sudden outpouring of foreign material, as bowel content, blood and urine into the abdominal cavity. It is never present in cases of extraperitoneal rupture of the bladder or in injuries of the abdominal wall, without internal injury. I did not find it present in a case of rupture of the liver in which the rupture was small, and down in the lobus Spigelii with the blood confined by liver stomach, and omentum so that the parietal peritoneum was not flooded. In one case of severe bowel injury I failed to find it although the abdomen was full of blood. I do not know how to account for its absence in this case and until we know more about it I think it wise not to look upon its absence as indicating no internal injury. I am positive that abdominal rigidity has no bearing on the production of the sign, as I have found it in perfectly soft, flaccid abdomens, as well as in those that were rigid. The fluid itself could not be responsible, for it is too little in amount in many cases, and besides fluids do not carry these sounds as well as gas, or the tissues.

I have found the sign present in cases of ruptured mesentery with hemorrhage, ruptured spleen ruptured bowel, ruptured liver ruptured tubal pregnancy and immediately after rupture of an appendix. It should be present in ruptured gastric and duodenal ulcer as it is in cases of typhoid perforation. It should be of value in differentiating ruptured gastric and duodenal ulcer from appendicitis, as it will appear at once in these cases, and not in appendicitis until rupture has occurred. It is not present in post operative cases. It was noted in one case doing badly after appendectomy but as the patient was doing fairly well it was deemed best to watch and wait. After a week the cul-de-sac being full and fluctuating, it was opened, and a large amount of blood and clot removed, due to a slipped ligature on the meso-appendix.

In a case sent in, with a history of a squeeze through the hips and abdomen, and catheter showing a small amount of bloody urine, the sign was not present. But with this history and the findings present it was thought safer to open him up. This was done, and showed no trouble intraperitoneally. The abdominal wall was severely contused, the space of Retzius contained some clot, and the bladder was contused, with a possible small laceration of the mucous membrane.

This sign is clear and distinct when it is present and can be elicited without any instrument whatever by anyone who has one good ear. I therefore think it should always be looked for and when it is present the abdomen should be opened as soon as the patient can be moved to a hospital, or if that is impossible, or too time consuming, as soon as it can be done at home. The sign is not found in a slowly developing effusion, as in peritonitis or ascites. I hope that it will be followed up and some one will be able to find just what causes the transmission, and how much it can be relied upon as a negative as well as positive sign of internal injury.

HABITUAL OR RECURRENT DISLOCATION OF THE SHOULDER

Eighteen Shoulders Operated On in Sixteen Patients. A New Axillary Operation

B T TURNER THOMAS, M D Philadelphia

CAPSULORRHAPHY for the cure of recurrent dislocations of the shoulder is gaining favor slowly but much less rapidly than it deserves. It is an interesting fact that while a fairly thorough search of the literature showed the results to be almost uniformly favorable, a second paper by the same surgeon was not found Various explanations could be offered for this fact, but they would all be included in the statement that the operation and its reported results lack the confidence of the profession. Perthes alone reported as many as four cases on which this operation had been done, most of the surgeons reporting cases having operated only once Greater experience increases my confidence in the efficacy of the operation and throws new light on the etiology and pathology of the condition. The exposure of the capsule through an incision posterior to the axillary vessels has advantages which will probably increase confidence in the operation.

The frequency of these cases has not been established even approximately but they are undoubtedly much more frequent than previously thought. According to my experience, they are much more frequent than old unreduced dislocations, but much less obvious to other people, patients sometimes having the condition unknown to intimate friends. They are not prone to discuss freely their weakness, but would be glad of a cure They are not anxious, however to undergo an operation which is not well established and is not generally recommended. Burrell, who was one of the earliest in this country to do this operation, called it an anatomical operation. The occasional operator without a good anatomical knowledge of the route by which the capsule is to be exposed, should not undertake it With such a knowledge it becomes remarkably safe and very effective The condition is merely hernia of the joint, and the operation is, in my opinion more safe and effective than the Bassini operation for inguinal hernia How much violence a shoulder will stand after the operation has not yet been demonstrated but the cases here reported show some interesting results in this respect. In one of my epileptic cases, recurrence followed each of my two operations, but I am confident that early operation would have prevented it in this case. A partial excision of the humeral head is probably the only operation which will now prevent it. In another epileptic, the reshaping of a deficient glenoid cup was necessary for a cure. In three other epileptics there have been no recurrences since operation, although in one there have been as many as sixty-eight epileptic attacks since operation.

The history of capsulorrhaphy is largely one of changing technique. Perthes varied the method of exposing the capsule in each of his four cases, and his experience illustrates in an interesting manner the difficulty of exposing the shoulder capsule for a plastic operation on it. In his first case he carried the incision from the coracoid process along the anterior margin of the deltoid nearly to its insertion and, after dividing it near its insertion, turned the incision upward along the posterior border of the muscle to about its middle. The large flap thus formed permitted a free exposure of the joint without injuring the circumflex nerve. In the second case an incision was made along the spine of the scapula and acromion and a 0.5 to 0.75 cm. strip of these bones was separated by the chisel, to be wired in place later In his third case he made an incision along the anterior margin of the deltoid. Above the coracoid process the fibers of the deltoid were divided up to the clavicle. One centimeter from its tip the coracoid process was sawed through and the tip turned downward with its attached muscles. The pectoralis major was later divided for retraction inward The particular object was to expose the anterior glenoid *margin* In the fourth case he employed the usual anterior resection incision and partially divided the deltoid at its origin from the clavicle.

From a study of the cadaver I concluded to make the incision in the axilla, anterior to the large vessels and nerves. This operation was performed on twelve of the eighteen shoulders It is still preferred to any of the operations previously done, but I do not expect to do it again unless for some special indication which I cannot now foresee. It has one disadvantage, which I sought to overcome, but without marked success after twelve operations. Exposure of the capsule is obtained only under constant,

strong traction on the edges of the wound, especially on the outer side. It was employed in two cases by Telford,[1] who regarded it as distinctly superior to other operations, and was referred to very favorably by Stimson. The axillary route became much more valuable when the capsule was exposed through an incision behind the large vessels. This was suggested by the observation that the humeral head in passing to the dislocated position did not push the axillary vessels and nerves in front of it, but came much nearer to the surface behind the vessels. The operation still remains an anatomical one chiefly because of the position of the circumflex nerve, which however is more easily located and avoided than in the anterior operation. The anterior operation required from an hour to an hour and a half the posterior can be done in from twenty minutes to a half hour. After the skin and fascia have been divided, exact attention must be paid to the anatomical route by which the capsule is to be exposed.

Posterior axillary operation. To better provide the necessary asepsis the arm is surrounded by a sterile towel from and including the hand to the shoulder region the towel being held in place by a sterile bandage. This will permit the necessary movement of the limb during the operation without endangering the asepsis. The arm is then placed on a small side table at a right angle or slightly more with the body. An incision four or five inches long is made posterior to the axillary vessels with its center over the humeral head, which is easily felt by deep palpation. The vessels cannot be located well by palpation but if the incision is made where the posterior axillary fold muscles fuse with the arm it will be posterior to the vessels. When the skin and fascia have been cut, the handle of the knife will easily expose the glistening tendon of the latissimus dorsi in the bottom of the wound. Immediately above it will be found the subscapularis, which is not tendinous here. Through this muscular interspace is to be exposed the capsule which lies immediately under the subscapularis and adherent to it. This muscle therefore must be retracted upward and inward and can be separated from the capsule by the handle of the knife or the finger. Before this step is begun however the circumflex nerve and its accompanying vessels must be located. With the humeral head in the socket, they lie at the upper or humeral end of this muscular interspace. If the head is in the dislocated position, the nerve and its vessels may pass over the most prominent portion of the head so that one may come down on them unexpectedly. I have done this several times without special risk to the nerve, but I prefer to have the head in the socket and know *from the beginning more exactly where it is to* be found. About two and a half inches below the circumflex, the dorsalis scapulæ branches of the subscapular vessels pass backward through the interspace. The latter may be divided between ligatures to permit a freer retraction upward of the subscapularis, but *not before the circumflex nerve and vessels have been identified.* I have not divided the dorsalis scapulæ vessels, except in one case in which one of the veins was opened. The retractor pushed them aside sufficiently to permit the upward retraction of the subscapularis. The exposure of the capsule obtained was not a free one but was quite sufficient for the necessary work on it.

In three out of the seven cases in which this operation was done not even catgut ligature was necessary and there was very little oozing. In another case only two ligatures were applied. After locating by palpation the anterior glenoid margin and humeral head through the capsule, the latter is incised from the upper to the lower limits of the joint about midway between the glenoid and humeral attachments. The upper part cannot be seen, but is easily and safely cut by the knife or scissors under the guidance of the finger. The joint is then explored by the finger. A small piece of bone may be detected in the antero-inferior part of the joint loosely attached by a fibrous pedicle or embedded in the capsule. In the latter case it may be allowed to remain. I have never known a patient to complain of symptoms indicating a loose body in the shoulder joint in any of these cases. They are detached fragments of the anterior glenoid margin produced in the original dislocation, i.e. they are tear fractures. If sought for there will be found probably I say, more or less shallow groove in the postero-superior portion of the humeral head where it presses against the anterior glenoid margin in the dislocated position. A very deep groove of this kind was probably responsible for the failure of my two operations in one case to prevent recurrence. In most cases the defect is too shallow to have any influence on the result of capsulorrhaphy. With the head in the socket the margins of the capsule wound are overlapped.

The only case in which I have had operative trouble was one in which necrosis resulted from a capsule suture under too much tension. I have

[1] Lancet, Lond., ii, Aug. 20, 1881, p. 344. Fractures and Dislocations, 1901, edit. p. 444.

guarded against this ever since. Soon afterward plain catgut was substituted for chromicized then the number of capsule sutures was reduced, and in the last four cases no suture was left in, In two of these neither suture nor ligature being left in the wound. In two cases a long silk mattress suture was so introduced that the lower margin of the capsule incision was drawn upward under the upper margin, the suture being clamped near the capsule by a long forceps which answered temporarily for a knot.

In a more recent operation three such sutures were employed for more accurate overlapping Interrupted catgut sutures were then passed through the skin margins of the wound but not tied. A small rubber drainage tube was passed upward under the subscapularis to the capsule. The joint being opened widely and the wound not being compressible by a bandage, an accumulation of fluid tends to form in the wound if a tube is not employed. I have never had occasion to regret using it, but on two occasions hav regretted not using it. The introduction of a grooved director evacuated the accumulated fluid, and a small tube used for a short time, prevented a reaccumulation. The tube is usually removed on the day following operation. When the skin sutures are in, the arm is brought nearer to the side of the body and the skin sutures tied. The arm is then brought as near to the side as is compatible with the removal of the forceps clamping the silk suture When the forceps is unlocked, it is first pushed upward to tighten the suture, which is then easily withdrawn by pulling on one end. The overlapping of the capsule margins is thus maintained and cannot be disturbed afterward because the arm will not leave the side until after cicatricial union is complete. A number of layers of gauze are placed high in the axilla to cover the wound and the arm bandaged in the Velpeau position

When the bandages are removed on the following day the dressing will be saturated with joint and wound secretions. The tube can then be removed and the dressings reapplied as before. Usually they need not be changed again for ten days or two weeks, when they are entirely removed and the patient allowed to pass the arm into the sleeves of his coat and shirt H cannot now abduct the arm far enough, voluntarily, to produce a dislocation An epileptic would require immobilization for about four weeks, because of the danger of an epileptic attack before this time. At the end of the third week a non-epileptic patient should begin to force the arm upward anteriorly At the end of the fourth week I permit him to use as much force as he can, actively and at the end of the fifth week as much as he can, passively in forcing the arm upward. This is the only movement I insist upon, and it is easily carried out by the patient by climbing a hanging rope, hanging from a horizontal bar or creeping up the side wall with his hand, marking his progress from day to day When he can raise the hand on the affected side as high as on the other all movements of the shoulder joint will be about normal. After the posterior axillary operation, return of normal movement is much more rapid and less troublesome than after the anterior operation, because the large vessels and nerves are not involved in the cicatrix and only the shortened capsule requires stretching.

The advantages of the anterior axillary operation over others previously employed have been discussed elsewhere.[1] Briefly they are as follows The incision is only five or six inches long it leads directly to the portion of capsule to be shortened gives perfectly dependent drainage and divides only one muscle, the subscapularis half way across. The advantages of the posterior axillary operation over the anterior may be summarized as follows (1) The wound is smaller ( ) The large axillary vessels and nerves are not exposed, and the circumflex nerve and its vessels are more easily exposed identified and safeguarded. (3) The anterior circumflex vessels are always divided in the anterior operation, never in the posterior (4) Access to the capsule is much easier and more rapid. (5) No muscles are divided. (6) There is practically no hemorrhage in the anterior operation there was always considerable oozing. (7) The time of operation is only about a third of that necessary for the anterior (8) Return of normal motion is much more rapidly and easily obtained. (9) The elimination of buried material, as ligatures and sutures, and the small direct wound to the capsule in the dependent position, reduce the risk of operation to a minimum. If it were not for the position of the circumflex nerve and the opening of the joint, the operation on the early uncomplicated case might properly be placed with the minor operations.

All the cases operated on are included here, the four already reported to show how they have progressed since Details are sacrificed for brevity except where they concern phases of the condition and operation not previously brought forward. The patients have all been heard from very recently

Case 1. Athlete 3 years old at time of operation. First dislocation in football game in 904. Wore shoulder brace for several years, but dislocation recurred while wearing it. Operated on Jan. 8 906. Obtained practically full motion in eight to ten weeks, and later absolutely full motion. Has never had dislocation since although he has used the arm violently in many ways, as in gymnasium work and semi-professional boxing.

Case 2. Coal miner 4 years old at time of operation. First dislocation 5 to 30 years before. Recurrences finally became so frequent that at times they would occur every day sometimes two and three times a day and sometimes while asleep in bed. Had to give up all work because he feared to take the arm from his side. Operated on Jan. 30, 909. Thirteen weeks later he fell headlong from balcony over railing which was 7 feet from the ground. He evidently struck on his hands with the arms in abduction, a position particularly likely to produce the dislocation. He had long wound of the scalp and probable fracture of the skull which confined him to bed for nine weeks and left him with disturbed mentality for months afterward. He still complains of intracranial troubles. He later returned to his work in the coal mines, has never had dislocation since the operation, and believes that this arm is the strongest part of his body now.

Case 3. Hospital orderly, 36 years old at time of operation. First dislocation in May, 904. Was operated on July, 906, for the purpose of shortening the capsule. The dislocations recurred after this operation. March 26, 909, he was again operated on, but recurrence again followed the operation. I did the third operation June 6, 909. He has had no dislocations since but he has had other troubles. These began with strangulation necrosis of the capsule resulting from chromicized catgut sutures, applied under too much tension and grasping too much tissue, because of my anxiety to prevent further dislocations. The discharging sinus healed completely soon after the appearance in the dressing of the most intact catgut suture. The return of motion was much slower in this than in any of the preceding cases abduction being limited to about 45 degrees at the end of about a year and a half. At this time he had been training young professional boxer for months, and the exercises had become very vigorous and even violent the patient being able to strike almost as hard blow with the affected arm as with the unaffected arm. One day in boxing he had severe pain in the affected shoulder but continued the boxing. He did not report to me for month later. During this time and for month after reporting to me, he continued to work as railroad brakeman. He localized the pain on movement to the posterior part of the shoulder. I concluded that he had ruptured few fibers of the deltoid and that they would ultimately heal without much trouble. About month later he returned showing small lump in the region of the chief pain, about the size of cherry. This was incised and small quantity of pus evacuated. The sinus persisted and limitation of movement indicated that the joint was involved, although the pain and swelling usual to this condition were not present. There was little change by June 9, except that the stiffness of the joint was more marked. By this time I had concluded that during boxing, in violent abduction or external rotation movement the overlapped and now very strong capsule sustained the force, and instead of giving way itself had torn away fragment of the anterior glenoid margin. On opening the joint June 6, 9, an irregular projection of this portion of the cup was found and probe passed into the joint through the sinus appeared in the joint just below this glenoid projection. The anterior operative wound was closed and the sinus enlarged for better drainage. Many times the sinus closed only to open again. Finally on May 27, 9, the head of the humerus was excised. The wound closed in seven weeks. The movement of the new shoulder-joint, while slight, is increasing continually the power of the whole hand is returning very favorably and the patient has very useful arm from the excision. He was formerly semi-professional baseball player and since the operation has played through several baseball games with considerable success, the movement of the scapula providing fair range of movement of the arm.

If I had seen the patient immediately after the first occurrence of the pain in boxing and had then interpreted properly the cause of it, immobilization of the arm at the side would have brought the fragments accurately together. Five or six weeks good union would undoubtedly have taken place and in short time the motion of the joint would have been about as free as before the accident. The patient, failure to first, and later to appreciate the gravity of the condition, led to necrosis and suppuration with sinus formation, and finally to excision of the joint. But excision was the operation of choice before capsulorrhaphy was introduced. The necessity for excision in this case was due primarily to capsule suture and this fact has led me to abandon the capsule sutures entirely so that such complications cannot occur again.

Case 4. Man, years old at time of operation. First dislocation 5 years before from fall in an epileptic attack. Has had twelve dislocations, most of them in epileptic attack. First operation Oct. 6, 909. About one week after operation, when he had practically full motion in the shoulder the patient reported that after an epileptic attack his shoulder which had been operated on, would be painful. Soon afterward he reported that the dislocation had recurred, but that the head was not as far out as before the operation. Later they were as complete as before operation. Second operation, Nov. 5, 9, at University Hospital, before members of Surgical Congress. Incision pos erior to axillary vessels, with humeral head in dislocated position. Circumflex nerve found crossing most prominent portion of head. Several small vessels divided—probably branches of dorsalis scapulæ. Capsule found to be about half an inch thick from previous overlapping. Edges of incision in capsule again overlapped by catgut sutures, small gauze drain to lower wound, hemorrhage, dressing and Velpeau bandage. Drain removed in 4 hours. Skin sutures removed and patient left hospital 4 days after operation. Velpeau position maintained four weeks. Could then abduct arm only to 45 degrees and external rotation was very slight. Continued to bind the arm to the side at night. Seven weeks after this operation he had dislocation while in bed with the arm bound to the side. Has been having them ever since and they are now more frequent than before the first operation.

The defect in the posterior and upper portion of the humeral head was unusually deep and wide at time of first operation and it had grown larger at time of the second operation. The epileptic convulsions in this case are unusually strong and with the large defect in the head made conditions such capsulorrhaphy probably will not cure. Only excision or other means will prevent the recurrences.

My conception of the part played by the defect in such a case as this is as follows. In the normal shoulder bony contact is maintained at all times between the head and glenoid cavity even in the extremes of normal movement. In extreme

abduction the axillary portion of the capsule must first tear extensively the outer surface of the surgical neck must strike the edge of the acromion and the head must be pried out of the socket, before a dislocation can occur In such a case as this one, the resistance of bony contact between the head and glenoid is lost as soon as abduction has been carried far enough to bring the deficient portion of the head opposite the anterior glenoid margin The only resistance which then prevents an anterior dislocation is that of the anterior portion of the capsule which gradually yields to the powerful contractions of the axillary fold muscles in the successive epileptic attacks. As soon as the groove in the head fits accurately to the anterior glenoid margin, the pressure of which in the dislocated position produced the groove the head will be in the fully dislocated position. When the groove in the head is very small and the patient is not an epileptic, the cure seems to be permanent and the shoulder very strong Even in most epileptics, as my cases show the dislocations do not recur after capsulorrhaphy The lesson which this case teaches is that capsulorrhaphy may be delayed so long, particularly in an epileptic, that this operation may not suffice for a cure.

Case 5. Medical student, 20 years old, athlete. Referred by Prof R Tait McKenzie Right shoulder dislocated in September 1908, while playing football. Arm not bound to side after reduction and patient played football again same day Second dislocation about month later from throwing stone Has had about eight dislocations all together some while asleep in bed Can fully abduct arm without producing dislocation, but avoids this movement as much as possible At first he gave up all athletics except swimming, and after having three dislocations in six attempts at swimming gave up this exercise also. Operation Nov 3, 1909 in University Hospital on service of Prof. J William White Incision anterior to axillary vessels Loose piece of bone attached by fibrous band found in lower part of joint, and corresponding defect in anterior glenoid margin. It was clearly detached fragment of the glenoid and was about ½ in long and ¼ in wide and thick Operation completed as usual Small drainage tube removed on following day and patient allowed out of bed Skin sutures removed and patient left hospital 5 days after operation Prof McKenzie took charge of exercises to restore motion, which was normal in four weeks. About six weeks after operation, as thrown from sled while coasting and sat down an embankment, without injury to the shoulder During following summer played tennis and swam good deal On one occasion heavy boat which he was using in swimming, turned over in shallow water. While trying to turn it right side up, he had almost succeeded, when it turned backward again. He attempted to prevent this backward turn with the arm operated on, which required very strong effort on his part and resulted in violent wrenching of the shoulder in abduction and external rotation There was momentarily the sensation of the head jumping out of the socket On his return to college that fall he began to play football On one occasion he fell headlong with the affected arm in extreme abduction. He again experienced the same sensation as when trying to prevent the boat from turning back and He has had no trouble in this shoulder since, although he has played tennis and baseball, and has done much swimming.

Case 6 Man, 30 years old, chronic alcoholic and epileptic. Recurrent dislocation in both shoulders Has been having epileptic attacks for 5 years. Had his first dislocation in left shoulder in an epileptic attack about two years ago. Arm bound to side after reduction by a physician, but patient removed bandage on following day and did not have it replaced afterward Does not know how many dislocations he has had in this shoulder but they recur sometimes as frequently as four and five times day He can produce it voluntarily with the arm at the side of the body which is very unusual, but the head tends to jump back into socket on slight muscular effort. About eight months after the left shoulder was first dislocated, the right was dislocated in an epileptic attack and recurrences have been taking place in this shoulder at variable periods since. He did not bind the arm to the side after the first nor any of the succeeding dislocations. He says that he can produce the dislocation in this shoulder voluntarily but it gives so much pain that he does not care to do so.

Operation on right shoulder at University Hospital in service of Prof. J William White Dec. 1909 operation on left shoulder Jan. 8, 1910, both through anterior axillary incisions On passing finger into and examining this joint (left) it was found that the anterior half of the glenoid cavity was missing. Its posterior intact portion was represented by strip of cartilage-covered rim about half an inch wide, extending from the attachment of the long head of the biceps above to that of the long head of the triceps below both of which attachments were intact. The whole anterior portion of the glenoid process had been worn away by the frequently repeated recurrences (often five or six a day) In the dislocated position the posterior portion of the head pressing strongly against the anterior glenoid margin The effect of this condition on the glenoid was to produce a sloping surface from the posterior glenoid margin forward and inward into an abnormal pocket which received the head in the dislocated position It seemed surprising that the head could stay in its normal position at all, yet it required considerable muscular effort on the part of the patient to dislocate it and only little effort was necessary to cause it to jump back into the socket, where it could remain until forced out again. I had not expected to find this condition and had not received permission from the patient to do more than contract the capsule as in the right shoulder, and this was all that was done at this time Primary healing drainage tube removed on following day arm kept bound to side of body for 5 days On April 3d had almost full motion in right arm and could raise left arm above his head. Feels a crack in left shoulder from time to time but has not had dislocation in either shoulder since the operations

The patient spends most of his time in institutions because of his alcoholism and epilepsy, so that I lost sight of him for a long time In September 1910 I looked him up to find how he had been getting along He reported only two dislocations in the left shoulder and none in the right. He probably had had more in the left In the following spring he came to me asking for another operation on the left shoulder and giving me permission to do what I thought necessary to prevent the dislocations I operated on him in the Philadelphia Hospital in the service of Dr A. C Wood, April 1911 This operation consisted in chiseling away the posterior portion of the glenoid cavity through a posterior incision

expected, limitation of movement severe when the dressings were removed. He was discharged July 28, 9 and later readmitted to the Institution for Feeble minded in Spring City Pa. The physician in charge Dr H M Carey, reported that there had been no dislocations since his readmission, that the patient had fair range of movement of the arm, but that he died March 30, 9 3 from the effects of epilepsy

CASE 3 Man, 1 years old, strong and ignorant, referred by Dr C F Martin, of Scranton, Pa. First dislocated his right shoulder 3 years before operation. Reduced by physician and arm bound to side for three or four days, after which he used it as freely as the pain would permit. Does not know how many dislocations he has had. Had the last one about three weeks before operation and another two weeks before that. From the beginning, pain has been severe for few days after each dislocation and reduction. Operation at the West Side Hospital Scranton, Pa Sept. 24, 9 Drs Norman White and C. F. Martin assisting. Usual operation through posterior axillary incision. No ligatures used capsule overlapped by one No plain catgut suture. Shallow groove in posterior part of head at usual site small rubber tube drain catgut sutures for skin, Velpeau position. Tube removed in 24 hours. Left hospital in 4 days. Dr Martin reported (Oct 29, 9) that patient had almost full abduction, and Dec 9 2, when I next saw him, he had full motion and excellent use of arm

May 3, while driving light wagon, his horse stumbled and fell. In hurriedly jumping from the seat he had grasped the dashboard with his right hand and had one foot on the side step when the horse got up and toppled over again. This threw the weight of his body on the right arm, causing it to twist and in external rotation and abduction, and when he landed on the ground his right shoulder was dislocated. He did not have the arm bound to the body after reduction of the dislocation. Although he had been having recurrences every few weeks before operation, he has not had any more since May 1, 1 date, August 30th, nearly four months. If he had reported the accident to me immediately I could have had the arm bound to the side in the Velpeau position for at least three weeks. I believe that there must have been considerable laceration of the axillary portion of the capsule and that with three weeks immobilization of the arm in abduction and internal rotation the important axillary portion of the capsule would have been cicatrically shortened again — perhaps more shortened than by the operation. This might have made the shoulder as strong or even stronger than before this last dislocation. He reports that it feels just as good as before this dislocation that he uses it freely and that it seems perfect in every way that he has played baseball lifted 50 and 75-lb chests of tea, 60 and 5-lb bags of coffee and has been doing pushing and lifting and heavy work around again.

CASE 14 Man 36 years old referred by Dr J J Rothberg. First dislocation from falling down stairs with arm in hyperabduction. After reduction, arm bound to side for about days or two weeks. 1 August 9 had his second dislocation, while trying hold another person down on couch, when the arm was forced into abduction. Had third dislocation Dec 8, 9 while in trolley car which gave a lurch, wrenching the shoulder while he was grasping handrail. The arm was still bound to the side when I first saw him Jan 5 9 3. Operation at Hetson Hospital Jan 8, 9 3. Incision posterior to axillary vessels. Finger in joint recognized shallow groove in head at usual site. Capsule overlapped by two long forceps, one grasping each margin of the capsule incision skin sewed closed by No plain catgut sutures. No ligatures used in this case. When arm was brought down to side forceps employed to maintain overlapping of capsule margins removed. Small rubber tube for drainage; dressing Velpeau bandage tube removed in 24 hours. Patient left hospital at end of week, when Velpeau bandage was removed and arm bound to side, the wrist being supported from the neck by a sling. All bandages removed at end of second week. Now has full motion and has had no dislocations since the operation.

CASE 5 Man, 3 years old, athlete, referred by Dr. I J Phillips of Clinton, Pa. First dislocation in basket-ball game in the latter part of 908. Arm not bound to side but shoulder remained painful for few weeks. Does not know how many dislocations he has had, but during past 3 year they have recurred from slight provocation, as when he is in bed with his arm in abduction. Operation at Stetson Hospital, Jan 29, 9 3. Incision posterior to axillary vessels. Ligatures were employed but divided cut in the lower part of the wound, and there was some oozing that could not be controlled by forceps and ligatures because of its depth. Finger in joint found shallow groove in head at usual site. Overlapping of capsule margins again accomplished by long forceps. No plain catgut sutures for skin wound gauze drain for coarse dressing Velpeau bandage. Gauze drain removed on following day. Left hospital 6 days after operation, but remained in the city for another week when all bandages were removed. Did not begin to force arm upward until beginning of fifth week. 7 months after operation he wrote that he had almost perfect action of the shoulder. More recently he wrote that he had been playing baseball and using the arm as vigorously in other ways, without disturbance of the shoulder except an occasional pain.

CASE 6 Miss 3 years old, carpenter and ship steward. Had his first dislocation in 89 while reading. A fellow-workman reduced it. Did not bind arm to side. Later arm has had marked limitation of abduction and external rotation. Cannot abduct much beyond right angle. The arm gradually grew worse with successive dislocations, which were very irregular as to the intervals between them, but they have grown in frequency and ease of production. They have occurred while he was asleep in bed. He can earn more money and prefers to work as ship steward, but he gave this work up seven or eight years ago because of the horror of physicians on the ship and the rush involved in rough seas. Operation at Philadelphia Hospital April 3 9 3, in service of Dr A C Wood. Incision three inches long, posterior to axillary vessels. Small groove in head of humerus at usual site. Edges of capsule were then overlapped by long silk suture which was later withdrawn. No ligatures employed except for skin small tube for drainage dressing, Velpeau bandage tube removed in 48 hours. Primary healing. All dressings removed April 28th, and arm placed in sleeves of shirt and coat. Remained in hospital until he could go to work. Discharged May 16 9 3. Said that he then had better motion and use and more power in arm than before operation and that the condition was improving continually. July 3, patient asked for and received permission to go to sea again. He has had no dislocations since the operation.

CONCLUSIONS

The operation of capsulorrhaphy cures in the great majority of cases. As performed in my last five cases it involves very little operative trauma primary union is obtained, and the patient may leave the hospital within a week.

Several of the patients returned to their usual occupations at the end of three weeks, and two students returned to their classes in one week.

Of the eighteen shoulders operated on, there were five in which the dislocation occurred after the operation. In one of them (Case 4) the large defect in the humeral head and the powerful epileptic convulsions made the case incurable by capsulorrhaphy. Early operation, when the defect was slight or absent, would have been effective, as shown by the successful results in three of the other five shoulders in epileptics. In Case 6 an epileptic, it was obvious at operation that the large defect in the glenoid cavity of the left shoulder would render capsulorrhaphy ineffective, although it reduced the frequency of the recurrences very much. As was proved by the second operation on this shoulder capsulorrhaphy is sufficient for a cure of *this* condition. If the cup is reshaped. Early capsulorrhaphy, alone, would have been sufficient. The dislocation after operation in Case 7, in my opinion, was a new traumatic dislocation, such as that to which the normal shoulder is exposed. The two attempts of the humeral head to leave the socket, in Case 5, indicated that the capsule had not been sufficiently tightened by the operation, but the frequency with which he has exposed this shoulder to the violence of tennis and baseball playing without a recurrence in nearly four years, indicates that the cure is permanent except for severe violence. This statement will probably hold true for Case 13 also. Of the 18 operations, therefore, it may be said that 16 were successful, one partically successful (Case 3) and one a failure, but even in this case the patient is no worse than he would have been without the operation.

The condition present in a recurrent dislocation is essentially that of a hernia of the joint, and the operation of capsulorrhaphy consists in the removal of the sac. It has one great advantage over operation for inguinal or other hernia. When recurrence after operation takes place in the latter a cure cannot be expected without another operation. While in Cases 5 and 13 the operative shortening was probably not sufficient to prevent recurrence from severe violence, it was sufficient to compel some laceration of the capsule before a recurrence could take place. If in such case, therefore, the arm is dressed in the Velpeau position for about three weeks afterwards, the cicatricial contraction of the torn and relaxed axillary portion of the capsule may make the joint as strong as it was made by the operation, or even stronger.

It is difficult to determine whether or not the shoulder can be as strong after operation as before. While I believe that it is not in these two cases, it is worthy of consideration that the right shoulder which the patient would naturally expose to the greater violence was involved in each case, and that severe violence was necessary to produce the dislocation in each instance. There have been no recurrences in either shoulder since although nearly four years have passed in one case. In Case 10 the patient insists that the first or traumatic dislocation in the right shoulder when it was normal occurred from merely raising the arm to catch a basket-ball, which did not strike the arm, nor did he fall or sustain any other violence. If a dislocation had occurred since operation in this case, from such violence as produced it after operation in Cases 5 and 13 could we say that the shoulder was stronger or weaker than normal after operation? That a first dislocation of the shoulder can occur from slight violence is well known. I have one patient who dislocated her shoulder while sitting in a rocking chair from merely raising her arms in the act of stretching.

Few normal shoulders are exposed to as much violence as was the one operated on in Case 7. That this one gave way after operation is to be explained by the fact that he did most of his work in wrestling with that arm and shoulder. The condition which developed in Case 3 is chargeable to the operation as then performed, but the cause responsible for it cannot develop from the operation as now performed.

In an epileptic, capsulorrhaphy is indicated after the first recurrence. It was performed at this stage in Case 11, and, although the patient has had as many as sixty-eight convulsions since, she has not had a recurrence of the dislocation since the operation. Spontaneous cure in an epileptic, after the first recurrence is very improbable. It may occur in a non-epileptic, but is very rare, and the patient cannot be certain that he will not have a recurrence while he is in a dangerous position. I would advise operation in any case after the third or fourth dislocation, because I believe that the risk of operation is less than that involved in depending, for protection in danger, upon an arm the shoulder of which is easily dislocated. It is probable that every case is curable by capsulorrhaphy when performed early and almost every case when performed late and that the only patients who will require a more severe operation are epileptics with large defects in the humeral head or glenoid cavity both of which are due to repeated recurrences of the dislocation.

expected, limitation of movement as severe when the dressings were removed He was discharged July 8, 9 and later readmitted t the institution for feebleminded at Spring City Pa. The physician in charge, Dr. H M Carey, reported that there had been no dislocations since his readmission, that the patient had fair range of movement of the arm, but that he died March 30, 913, from the effects of epilepsy

CASE 3 Man, 3 years old, strong and vigorous, referred by Dr C. E. Murrin, of Scranton, Pa. First dislocated his right shoulder 5 3 years before operation. Reduced by physician and arm bound to side for three or four days, after such he used it as freely as the pain would permit. Does not know how many dislocations he has had Had the last one about three weeks before operation, and another tw weeks before that. From the beginning, pain has been severe for few days after each dislocation and reduction. Operation at the West Side Hospital Scranton, Pa Sept. 24, 9 Drs. Norman White and C E. Murrin assisting. Usual operation through posterior axillary incision. No ligatures used, capsule overlapped by one No. plain catgut suture Shallow groove in posterior part of head at usual site small rubber tube drain catgut sutures for skin Velpeau position Tube removed in 24 hours. Left hospital in 4 days. Dr Murrin reported (Oct 29, 19) that patient had almost full abduction, and Dec 3 912, when I next saw him, he had full motion and excellent use of arm

May 9 3, hole driving light span, his horse stumbled and fell. In hurriedly jumping from the wagon he had grasped the dashboard with his right hand and had one foot on the side step hen the horse got up and toppled over again. This threw the weight of his body on the right arm, turning t backward in external rotation and abduction, and when he landed on the ground his right shoulder was dislocated. He did not have the arm bound to the body after reduction of the dislocation Although he had been having recurrences every few weeks before operation, he has not had any more since May 1st, to date, August 20th, nearly four months If he had reported the accident t me immediately I would ha had the arm bound to the side in the Velpeau position for t least three weeks I believe that there must have been considerable laceration of the axillary portion of the capsule and that ith three weeks' immobilization of the arm in abduction and external rotation the important axillary portion of the capsule would ha been exactly short ened again — perhaps more shortened than by the operation This might have made the shoulder as strong or even stronger than before the last dislocation He reports that it feels just as good as before this dislocation, that he uses it freel and that it seems perfect in every way, that he has "played baseball, lifted 50 and 75-lb chests of tea, 100 and 5-lb bags of coffee," and has been doing pushing and lifting and heavy work around wagon

CASE 14. Man, 26 years old, referred by Dr J J Rothberg First dislocation from falling downstairs ith arm in hyperabduction. After reduction, arm bound to side for about days or two weeks. In August, 9 2, had his second dislocation, while trying t hold another person down on couch, hen the arm was forced into bduction Had third dislocation Dec 8, 9 while in trolley car which gave lurch, wrenching the shoulder while he was grasping handrail The arm was still bound to the side hen I first saw him Jan 5 9 3 Operation at Stetson Hospital Jan 8, 913 Incision posterior to axillary vessels Finger in joint recognized shallow groove in head at usual site Capsule overlapped by two long forceps one grasping each margin of the capsular incision Skin sured closed by N plain catgut sutures. No ligatures used in this case. When arm as brought close to side forceps employed t maintain overlapping of capsule margins removed Small rubber tube for drainage; dressing Velpeau bandage; tube removed in 4 hours. Patient left hospital at end of week, when Velpeau bandage as removed and arm bound to side, the wrist being supported from the neck by sling All bandages removed at end of second week Now has full motion and has had no dislocations since the operation

CASE 5 Man, 3 years old, athlete, referred by Dr F P Phillips of Clinton, Pa. First dislocation in basket-ball game in the latter part of 1908. Arm not bound to side but shoulder remained painful for few weeks. Does not know how many dislocations he has had, but during past year they have recurred from slight provocation, as when he is in bed with his arm in abduction. Operation at Stetson Hospital Jan 20, 13 3 Incision posterior to axillary vessels Two ligatures ere employed for divided vess in the lower part of the wound, and there was some oozing that could not be controlled by forceps and ligatures because of its depth Finger in joint found shallow groov in head at usual sit Overlapping of capsule margins again accomplished by long forceps No plain catgut sutures for skin wound gauze drain for oozing, dressing; Velpeau bandage. Gauze drain removed on following day Left hospital 6 days after operation, but remained in the city for another week, when all bandages ere removed. Did not begin to force arm upward until beginning of fifth week. 7 months after operation he rote that he had almost perfect action of the shoulder More recently he rote that he had been playing baseball and using the arm as vigorously in other ways, without disturbance of the shoulder except an occasional pain.

CASE 6. Man, 3 years old, carpenter and ship steward. Had his first dislocation in 1891, hile wrestling A fellow-s orkman reduced it Did not bind arm to side E er since has had marked limitation of abduction and external rotation Cannot abduct much beyond right angle The arm gradually grew weaker with successive dislocations, which are very irregular as to the intervals between them, but they have grown in frequency and ease of production They have occurred hile he was asleep in bed. He can earn more money and prefers to work as ship steward, but he gav this work up seven or eight ears ago because of the absence of physicians on the ship and the risk involved in rough sea. Operation at Philadelphia Hospital April 5, 913, in service of Dr A. C. Wood Incision, three inches long, posterior to axillary vessels Small groove in head of humerus at usual sit Edges of capsule incision overlapped by long silk suture hich was later withdrawn No ligatures employed catgut for skin, small tube for drainage dressing, Velpeau bandage tube removed in 48 hours Primary healing All dressings removed April 28th, and arm placed in sleeves of shirt and coat Remained in hospital until he could go to work Discharged May 6, 9 3 Said that he then had better motion and was mad more power in arm than before operation and that the condition was improving continually July 0, 9 2, patient asked for and received any permission to go to sea again He has had no dislocations since the operation

CONCLUSIONS

The operation of capsulorrhaphy cures in the great majority of cases. As performed in my last fi e cases, t involves very little operative trauma, primary union is obtained, and the patient may leave the hospital within a week.

The predominant symptoms are those of toxemia, with high leucocytosis, and acid urine containing bacillus coli communis in pure culture. The condition of the urine is significant and differentiates the infection from cystitis.

As Burnett (2) has shown, the bacillus coli communis does not decompose urea into ammonia, and hence the urine remains acid. It is also of interest to note that this germ does not produce an antitoxin.

The differential diagnosis of the more common form of pyelitis in pregnancy that in the right kidney is sometimes difficult. Often the kidney cannot be palpated distinctly the patient's pain is referred to the right lower abdomen, or even to the upper portion of the abdomen and may suggest right-sided pleurisy appendicitis, catarrhal infection of the gall-bladder chronic constipation, renal calculi, or salpingitis.

From the pain alone an exact diagnosis cannot be made. Clinically the existence of appendicitis can never be denied in these cases. An intelligent history will often assist in making a differential diagnosis, and a careful physical examination of the chest may enable one to exclude pleurisy The gall-bladder is so often invaded during pregnancy that a mild infection cannot be denied when indefinite pain and moderate disturbance of the pulse and temperature are present.

When we consider treatment, one may naturally inquire first, What would be the fate of these patients without medical attention? The development of surgical kidney septicæmia, and death have been reported sufficiently often to show us that such is more than a possibility In my observation, a patient who refused operation was critically ill for several weeks with repeated chills and fever finally giving birth to a dead child, and making a tedious recovery She, however received good hospital care and medication.

The post mortem appearances in these cases are learned from a very interesting report by Williamson and Barris (9) in an autopsy made upon a patient dying at St. Bartholomew's Hospital. The bladder was normal, the ureters dilated, containing purulent fluid from which pure cultures of bacteria were obtained Small abscess cavities were found in the kidneys with degenerative changes in the tubular epithelia

The patient from whom these specimens were obtained was treated by medicinal means and seemed to be improving, with normal temperature, when the ureters were catheterized under anæsthesia, to determine the condition of the renal pelves. This manipulation was followed by cyanosis, rapid breathing and death. In this case, the infection seemed to have come through the blood-stream. A pleural effusion was thought to be caused by the same organism.

Medicinal treatment is sufficiently successful in mild cases to warrant its prompt and thorough employment.

Andrews (1) success in 19 cases at the London Hospital with medicinal treatment only with one induction of labor illustrates what can thus be accomplished. The essentials of this treatment are rest, milk diet, purgation, the use of salt solution by continuous instillation at intervals, and the administration of hexamethylenamine with local applications over the kidney This treatment mitigates the patient's pain. It is a familiar observation with obstetricians that mild cases do well under this treatment.

When, however this does not promptly control the case, and the leucocytosis increases, the patient's temperature is higher chills develop and the toxemia is worse more radical treatment is indicated.

The suggestion to induce labor or to empty the uterus is natural under the circumstances but we believe mistaken Stoeckel's (8) remark that pyelitis is a complication of pregnancy and that pregnancy is not a complication of pyelitis, is exceedingly pertinent. The obstetrical rule should prevail that in all cases of acute infection complicating pregnancy labor should not be induced that the complications should be treated, and nature allowed to take care of the pregnancy It must be remembered that the goal of the obstetrician is the saving of both the life of the mother and child, and that no case can be considered completely successful which fails in this.

The induction of labor may add fuel to the fire as illustrated in a case reported by Sauvage (7) where pregnancy was interrupted with the death of the child, and as improvement did not follow nephrotomy was practiced, followed by the death of the mother

We cannot agree with Burnett (2) in his advocacy of the induction of labor

The effort to drain and disinfect the kidney without incision is frequently made by catheterizing the ureters and irrigating the pelvis of the kidney In favorable cases this may be done without anæsthesia, and good results are reported by those who have had experience in this treatment. In early pregnancy this method has been successful, and is certainly worthy of trial.

Neither medical treatment, the induction of labor nor catheterization of the ureters with irrigation of the pelvis of the kidney efficiently

THE SURGICAL TREATMENT OF BACILLUS COLI COMMUNIS INFECTION COMPLICATING PREGNANCY [1]

By EDWARD P DAVIS, M D Philadelphia

BACILLUS coli communis infection complicating pregnancy manifests itself most frequently by infection of the appendix and of the right kidney The following cases are illustrative:

Case I Italian multipara, aged 33 years, ill nourished, ill seventeen days, pregnant seven months, continuous pain over right abdomen vomiting and chills, pulse from 100 to 120 temperature from 101 to 103 F leucocytosis 16,600 urine acid, abundant bacillus coli communis in pure culture The left kidney could not be palpated, but the right kidney could be distinctly outlined and was considerably enlarged

The patient was treated by rest in bed, milk diet, hexamethylenamine purgation and the copious use of water, both failed to produce improvement The advent of chills suggested the development of surgical kidney and the need for operation.

The right kidney was exposed by the usual lumbar incision. It was much enlarged and dark bluish in color Stitches of chromicized catgut were passed through the two extremities of the capsule and the kidney incised along its convex border An abundant flow of dark blood followed. The finger of the gloved hand was passed through the kidney substance to the pelvis and the opening dilated sufficiently to permit the introduction of gauze drain. Blood from the kidney showed bacillus coli communis in abundance. The lumbar wound was closed at its extremities leaving the center open for drainage

An enlarged appendix was then exposed by the usual incision and removed It was in condition of chronic inflammation The patient immediately improved, and three weeks after operation came into spontaneous labor giving birth to an infant 46 cm long, and weighing 6 lbs. 8 oz Both mother and child made an uninterrupted recovery

Case II Patient aged 33 years, second pregnancy at five months sent to the Maternity Department of the Jefferson Hospital from the examining room of the General Hospital having been sent by physician with diagnosis of typhoid fever The patient had characteristic symptoms of toxemia with fever and intestinal disturbance

On examination the red blood cells were 4,500,000 leucocytes, 20,000 hemoglobin, 75 per cent An acid urine contained bacillus coli communis in pure culture in abundance No definite history of the duration of the patient illness could be obtained, as she had been under treatment for typhoid fever for some time before admission Neither kidney could be made out by palpation and the patient could give little information concerning her condition.

The right kidney was drained by the method employed in Case I The bacillus coli communis was found in abundance in the blood discharged from the kidney The appendix was post-cecal and was removed without difficulty The patient's recovery was uninterrupted, and her pregnancy was undisturbed She was discharged in good condition, as she preferred to be at home for her confinement

Medicinal treatment in this case prior to operation was unavailing and the patient's toxemia and fever were steadily increasing when the decision to operate was made

Case III A very ill nourished Italian multipara, aged 28 years, was admitted to the Maternity Department of the Jefferson Hospital because she was pregnant and complained bitterly of severe pain in the lumbar region

On examination the patient was emaciated, six months pregnant with living child, profoundly toxic, and complained of severe pain in the right lumbar region. Her relaxed condition permitted the right kidney to be distinctly outlined, considerably enlarged

Medicinal treatment failing, the appendix was first removed, inflamed and adherent. As no pus was present in the abdomen, and the appendix had not ruptured, the wound was closed without drainage The right kidney was greatly enlarged, and an abundant flow of very dark blood followed its incision. This contained in great quantity the bacillus coli communis, and the blood was highly infectious as the edges of the wound became infected, and the wound healed by granulation in consequence. The kidney was drained by the method described

Before operation the urine was highly acid, with abundant bacillus coli communis, the patient's leucocytosis was 35,000 She steadily improved, although the lumbar wound healed slowly until two months after operation, when she gave spontaneous birth to an eight months' child This was artificially cared for in the nursery of the Maternity As the mother could not nurse the child, she went to her home to care for her other children, returning frequently to the Maternity to visit the child left in our care. The mother made an excellent recovery

Since the publication of Opitz's (4) and Mirabeau's (3) papers, attention has been repeatedly drawn to bacillus coli communis infection of the kidney complicating pregnancy Appendicitis in pregnancy has been so thoroughly investigated that time and space permit no separate attention to that subject

Clinicians recognize infection of the right kidney as much more frequent than the left, and account for this in three ways First the ascending infection from bacillus coli infection of the bladder and ureters second hæmatogenic infection from the circulation of infected blood through the kidneys third infection of the right kidney by the bacillus coli communis from the neighboring and often contiguous colon, the bacilli making their way through the wall of the intestine into the lymphatics by way of the ureter and surrounding tissues to the pelvis of the kidney Clinical and experimental evidence establish these methods of infection

[1] Read before the 17th International Congress of Medicine London August 1913 Section on Obstetrics and Gynecology

to substances leaving no residue and stimulation freely employed.

These cases are reported to call the attention of the profession to the feasibility of surgical treatment for this condition in severe cases which do not improve after a reasonable time, and while under accurate observation with medicinal treatment.

The bibliography of the most recent literature is appended.

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A NOTE AS TO THE RECOGNITION OF THE URETER

Report of a Case of Anastomosis of the Ureter into the Appendix

By WAYNE BABCOCK, M D Philadelphia

During abdominal and especially pelvic operations it is oftimes of advantage to quickly and positively recognize the ureter While by painstaking search the ureter may usually be distinguished from other structures, if the tube is greatly displaced or embedded in new tissue or altered in caliber it may be found difficult to positively identify the structure.

Some time ago on exposing, by the extraperitoneal method, a ureter containing a stone, we found a tube of the size and thickness of small intestine It so closely resembled bowel that for a moment we hesitated to incise it It was found however to have periodic peristaltic movements which differed from those of the small bowel They were excited by stroking the tube and they also occurred spontaneously at equal and rather frequent intervals of time. These movements were so pronounced that they could readily be demonstrated to students seated number of feet from the operating table Later on studying normal ureters during the course of intra-abdominal operations, the peristaltic movements were found to continue regularly during the course of the operation, and they could easily be seen through the overlying peritoneum.

We have thus, by the characteristic peristaltic wa es, been able repeatedly to positively identify the ureter and to demonstrate it to others. Through the peritoneum the inosculating periureteral blood-vessels that form fairly coarse oval loops may be seen. During the peristaltic wave the caliber of the tube is not only diminished but the ureter marked by the attached vessels, may be seen to slide upward, and then after a momentary pause downward under the peritoneum. The movements are quite rapid, cover several millimeters and are succeeded by a fairly long interval. In one patient recently we found the interval to be 28 seconds. On stroking the ureter it became 12 seconds. There is no other columnar or tubular structure in the body that shows this type of peristaltic movement. In the intestines the peristalsis takes the form of succeeding waves and in the ureter the contracting wave is usually less apparent, the chief impression being the longitudinal sliding or trombone movement. It suggests the intermittent sliding of valve rods seen on steam vessels. Although certain ureters show a primary change in diameter with elevation of the tube, intestinal movements also have not the same orderly succession of peristaltic movement, and instead of being excited by stroking or manipulation they usually soon cease after the abdominal cavity has been opened. Any surgeon who will, for a brief period of time, expose

deals with the infected condition often present in the right lower abdomen. Whether this be appendicitis or a possible salpingitis, it is essential that the abdomen be explored and the appendix or infected tube removed. As an aid in determining which kidney is enlarged and the degree of enlargement, pyelography by the X ray has been successful in the Strassburg clinic, as reported by Schickele (6). By this method the kidneys may be distinctly outlined, and often the dilated ureters traced and valuable information gained as regards the site and method of operation. Should the ureters be shown by this method to be greatly dilated, and both kidneys be involved, the case would be suitable for catheterization of the ureters and irrigation of the kidneys. Should one kidney be distinctly palpable it may be drained by incision, with the removal of the appendix and should this not be sufficient the ureters subsequently catheterized.

Operations upon the kidney in pregnancy should not be considered as the last resort with an unfavorable prognosis. Pousson (5) at the French Congress of Gynecologists in 1910 in 66 cases of nephrectomy with following pregnancy had 50 patients delivered at term most of them nursing their children, and one becoming a wet nurse. Pinard removed a tuberculous kidney, the patient afterward passing through a normal pregnancy. *Within a few months in one of our wards*, a pregnant woman from whom one kidney had been removed for tubercular infection recovered from eclampsia. In 8 of Israel's cases with tubercular kidney with nephrectomy there occurred subsequently 15 pregnancies uncomplicated, followed by normal labor. Hartmann reported 113 renal operations on women, 35 during pregnancy and 78 followed afterward by pregnancy. *Among the 351 cases collected was* Cragin's vaginal nephrectomy for the removal of a displaced cystic kidney in the pelvis which was obstructing labor. This was followed by normal delivery. The experience of others coincides, and it is interesting to note that operations upon the kidney during pregnancy accompanied by disturbance of the uterus, often do badly while in cases where pregnancy remains undisturbed the *prognosis is good*. During pregnancy itself tuberculosis of the kidney is fortunately rare, as shown in the experience of Guy's Hospital where in the last twenty years no case of pregnancy with tuberculous kidney has been observed.

I desire also to report a case of intestinal infection in which, by exclusion, the diagnosis of bacillus coli communis infection is most reasonable.

An ill nourished primipara from acantropic regions, after spontaneous labor with living child, developed fever. Examination of the blood failed to reveal streptococci, nor were the usual signs of puerperal septic infection present. The fever was characterized by considerable elevation with sharp depressions and rigors of moderate severity. As the patient did not improve and abscess could not be found, it was thought that possibly she had pyosalpinx, or some obscure collection of pus. Her symptoms were fever, malaise and diffuse abdominal pain, about distention or resistance, but peristalsis, though impaired, was present.

On section the pelvic organs were normal, excepting small fibroid nodule on the posterior wall of the uterus. The appendix was enlarged at its base there were slight but recent adhesions between the coils of intestine and part of the transverse and the entire descending colon was thickened, red, and at one point beneath the peritoneal covering showed an ulcerated portion. The appendix was removed, adhesions separated, the fibroid nodule removed from the uterus and Mikulicz gauze drain placed at the bottom of the pelvis, with cigarette drain to the former site of the appendix. These drains were gradually removed. The patient made tedious recovery complicated by phlebitis of moderate severity. The Widal typhoid reaction was negative. Examination of the stools for amoebæ negative. *There was no evidence of syphilis or tuberculosis*, and the most reasonable diagnosis was colon bacillus infection of the large bowel. The tip of the appendix was practically normal, the base thickened and red.

In the *American Journal of Obstetrics* 1896, xxxiv No. 2 I reported a cæsarean hysterectomy followed by death, with symptoms of abdominal infection. At autopsy the field of operation by bacteriological examination was sterile. The *lining of the intestine was ulcerated and infection* had spread from these ulcers to the lymphatics of the peritoneum. The tests for typhoid, syphilis, tuberculosis and streptococcus infection were negative. The history showed that shortly before coming into labor the patient had taken violent irritant purgatives, hoping to terminate pregnancy with the death of the child.

We know that the colon bacillus is the germ *most frequently present in the intestine* and most often producing infection of the intestine and surrounding viscera. Clinical infection from this source is characterized by moderate fever with sharp descent, rigors malaise and the absence of signs in many cases, of abscess. Abdominal pain is often referred to the large bowel, especially in the region of the appendix. *Many of these* cases undoubtedly recover with medical treatment only, but where improvement in a reasonable time does not follow such treatment, the patient growing worse, I believe that section should be done. The appendix should be removed, adhesions loosened, collections of pus emptied and extensive drainage instituted. Salt solution should be given at the time of operation by intravenous injection, and afterward by the drop method in the bowel. Food must be limited

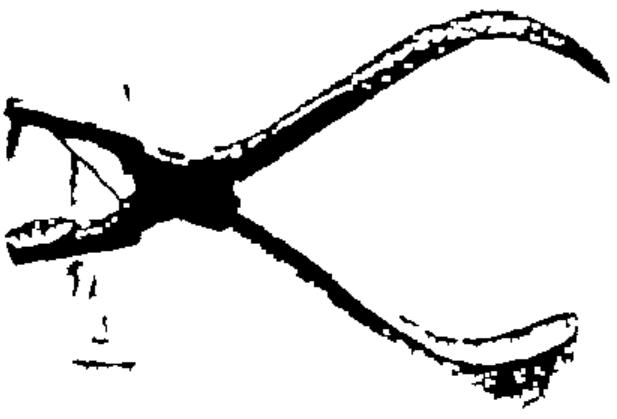


Fig Ainsworth rubber dam punch

this device for photomicrography I usually loosen one end of the label and push it aside and get rid of any minute fibers of paper which might tend to obstruct the field after the slide is properly centered and all is ready for the exposure of the negative

The following methods of marking slides are the only ones in use heretofore which I have been able to find

(*a*) Marking a circle on the cover-glass around the field with a pen and ink a very crude method.

(*b*) Using a pointer of gummed paper pasted on the cover glass this is useful to mark a particular object, but does not give a circumscribed field.[1]

[1] For a fuller description of methods B and C see Frank H. Hanford's Book of Photography." The brush marker (*b*) is described in detail by Professor Simon Henry Gage, in his standard work on the microscope.



Fig Slide with label in place.

(*c*) Maltwood's finder consisting of a glass the size of a slide ruled in minute squares. Each square contains two numbers which serve to identify the horizontal and vertical position of the square. The specimen to be marked is correctly placed under the objective, and its position on the stage of the microscope noted by means of the mechanical stage. The slide is then removed and the finder substituted. The numbered square, or squares, which appear in the field will then serve to identify the field for future reference, it being necessary to place the slide in exactly the same position on the stage each time. This method would not be satisfactory with microscopes not fitted with mechanical stages.

(*d*) A marker consisting of an objective like attachment which screws into the nose-piece of the microscope. This carries a small brush which is dipped in colored shellac, and made to rotate around the field thus enclosing it within a dark ring The position of the brush may be changed to vary the size of the circle.

TRANSACTIONS OF SOCIETIES

CHICAGO SURGICAL SOCIETY

REGULAR MEETING HELD NOVEMBER 7 1913, WITH THE PRESIDENT DR. M. L. HARRIS, IN THE CHAIR

Previous to the papers Dr Bevan arose to a question of personal privilege and said

DR. ARTHUR DEAN BEVAN As a question of personal privilege I wish to correct a statement I made, I think, at the last meeting of the Chicago Surgical Society in regard to an apparatus which is made by D Lemon, of Milwaukee. In a meeting before the Western Orthopedic Association, I understood Dr Ridlon to say that this apparatus of Lemon of Milwaukee was a modification of one which he had modified from the Bartlett apparatus, of Boston, and I made that statement in a discussion before this society Since that time Dr Lemon and Dr Ridlon have both called my attention to the fact that the apparatus which Dr Ridlon referred to was not Dr Lemon's apparatus, but the apparatus of another Milwaukee surgeon As a question of personal privilege and in justice to Dr Lemon, I desire to correct the statement made in a former discussion so that this fact will appear in the minutes of the Chicago Surgical Society

DR. ALFRED STRAUSS read a paper (by invitation) entitled An Artificial Ureter Made from the Abdominal Wall (See p 78)

DISCUSSION

DR. L. L. MCARTHUR I stand here simply as a sponsor for this paper and do not propose to enter into a discussion of it because I know very little about the experimental work that has been detailed to you this evening, but after seeing the slides and hearing the work of one of my former internes I felt that it was of such importance that the Surgical Society of Chicago was entitled to hear it first I believe that the work is indicative of practical application to the human being and one which will be really epoch-making in the way of advance for the replacement of those portions of the ureter which are occasionally of necessity sacrificed in a surgical procedure or destroyed by disease or by neoplastic infiltrations The work has been one of the first contributions which have come out of the new institution for scientific research at the Michael Reese Hospital, and is one worthy to be included in the volume of experimental research, one of which we, as members, of that institution are I think, justly proud.

DR. DEAN LEWIS The piece of work that has been described by Dr Strauss is very interesting. Surgeons have been slow in inventing and adopting new procedures for the repair of ducts. Recently Dr Carl Davis and myself have attempted to repair and reconstruct the common bile duct with living transplants, for reconstruction of the duct by a rubber tube, as recommended by Sullivan and Wilms, has never seemed to me to be entirely satisfactory Fascia apparently is highly resistant to bile and urine, providing there is no infection We have reconstructed the common bile duct by using free fascial transplants. After cutting the duct we have removed a piece of the sheath of the rectus muscle and have joined the two ends by a fascial tube, much as Dr Strauss has united the ends of the divided ureter The fascia has been transplanted free without a pedicle The fascia lives, there being no evidence of necrosis. In practically all cases there has been some dilatation of the duct above the transplant, but bile has passed on into the intestine

We have done the same thing with the ureter The ureter has been divided and the two ends have been united by a fascial tube, the fascia being transplanted free I the procedure employed by Dr Strauss I do not believe that the pedicle is necessary to preserve the life of the transplant There is more or less dilatation of the ureter above the transplant and some hydronephrosis, but urine passes beyond the point where the transplant was inserted I believe that in both the common duct and ureter the dilatation above the point at which the transplant was inserted is due to an interruption of the rhythmical waves which pass over these ducts. I believe that the method can also be used to reconstruct the salivary ducts in cases

of salivary fistula. These fascial transplants are apparently easily killed by infection and this, of course may prevent a wide application of the principle we have advocated

DR. CARL BECK The paper of Dr Strauss is highly interesting, not only on account of the macroscopical findings but also on account of the advantage of using local tissues for the first time as transplants It seems to me, however that another principle, which is much more simple enter into this work. I have a case in which I have used it. Where there is a partial loss of the ureter other structures can be used. I refer to the principle of using a part of the bladder as a transplant. It is a principle which has been used in the formation of the œsophagus. Some years ago we showed such a specimen before the Chicago Medical Society in conjunction with some work I did with Dr Carrel It consisted of the formation of an œsophagus from a flap which was cut parallel to the large curvature of the stomach, then turned upward and formed into a tube which was joined to the œsophagus This operation has recently been mentioned in the literature under other names than ours, but as our report of our experimental work was published only in the Proceedings of the Chicago Medical Society it has not found its way into the general literature The same principle can be used to make quite a long ureter from the bladder taking a portion of the wall and leaving it in connection with the wall, and so-called cysto-enterostomy by Bouri, and using a flap as long as you want it This work demonstrates that considerable portion of the ureter can be replaced from the wall of the bladder It is physiological tissue which can be used for reconstruction The same can also be used for the common duct from the intestine.

DR DANIEL N EISENDRATH The great difficulty as has been pointed out by Dr Strauss, with all ureteral plastics has been that the ureter sooner or later eats up the structure that you have transplanted on account of the irritating action of the ureter and sooner or later becomes converted into cicatricial tissue which presses upon the proximal and distal portions of the ureter in which we get stenosis at the point of transplantation with subsequent hydronephrosis At the time, I thought that if we could get some structure which was accustomed to the presence of urine, like the urinary bladder itself we might solve the problem of these transplantations successfully I did not know at that time of Bouri's work, and a free transplant was made between the ends of the ureter in the manner Dr Strauss has carried out, believing that this would overcome any cicatricial tissue. We pursued a technique practically the same as that of Dr Strauss, and as almost everyone would working in this field. Those who have used arteries or veins have inserted them between the ends and then sutured them, but the method pursued by myself and Dr Strauss in a modified manner was to take the transplant and make a sort of pseudo-bladder of it. Dr Strauss succeeded in uniting the distal edge, put in so as to project after the manner spoken of by Dr Beck in the reimplantation of the intestine. We obtained a number of successful unions by this method. A number of the dogs died from sloughing of the flaps. The flaps did not live and we had perforation and urinary fistula, which would open toward the outside. At other times the urine would escape into the peritoneal cavity and we had peritonitis The dogs that lived, as we found in our experiments, had hydronephrosis, the result of contraction of the transplant with dilatation above it.

DR. ALFRED STRAUSS (closing the discussion) With reference to the remarks made by Dr Lewis concerning experiments on the bile ducts his statement speaks in favor of my hypothesis regarding an acid or peculiar chemical reaction of the urine causing some slight degenerative change in the fascia which produces infiltration cartilage formation and bone formation.

Another point which favors this hypothesis is the transplantation of fascia to bile ducts, the bile being an alkaline medium which causes no chemical irritation and therefore no changes in the fascia. For instance, I believe Dr Lewis has transplanted the fascia lata into the abdominal wall and areolar fatty tissue, both of which have an alkaline or neutral reaction, and the transplant does not change its character This again speaks in favor of the acid or peculiar chemical reaction that causes this metaplasia.

Question Has Dr Strauss made any free transplants?

Answer Yes I have three living dogs operated three months ago in which the same technique was used except that a free instead of a pedicle transplant was used. My experience with this technique in the common bile duct has produced mostly negative results.

Regents t each meeting of that Board of the moneys received and expended, and shall furnish detailed statement of the financial condition of the College at each annual meeting of the Board of Regents. The Treasurer shall furnish a bond to the Board of Regents for the faithful performance of his trust.

(*e*) I the event of the death or resignation of the General Secretary or Treasurer the Board of Regents shall elect his successor from among the members of the Board of Governors to serve until the next annual meeting of the Board of Governors and until such time as his successor is elected and qualified

VI Board of Regents 1 The Board of Regents shall consist of the President of the Corporation, the General Secretary of the Corporation the Treasurer of the Corporation, and twelve members of the Board of Governors elected as hereinbefore provided.

The duties of the Board of Regents shall be those ordinarily performed by a board of trustees, namely the transaction of all detail business devolving upon the Board of Governors in carrying out the object of the organization the regulation and conserving of its property interests the creating, appointing, and directing of all standing committees the election of Fellows to the College the calling of all meetings of the Corporation not already provided for the arrangement of convocations or other meetings for the conferring of Fellowships the transaction of all business not otherwise provided for that may pertain to the Organization

2 The officers of the Board of Regents shall be a Chairman and a Secretary

( ) The Chairman of the Board of Regents shall be elected from among the members of the Board of Regents for term of one year and shall preside at all meetings of the Board In the event of his death or resignation the office shall be filled by election at the next meeting of the Board.

(*b*) The General Secretary of the Corporation shall be the Secretary of the Board of Regents

4 The Board of Regents shall elect the following committees Credentials 2, Standardization of Fellowships, 3, Legislation 4 Graduate schools and hospitals

(*a*) Each standing committee shall consist of five members, the Chairman of which shall be member of the Board of Regents The other four members may be selected from the Board of Governors or from the body of Fellows of the College

(*b*) Other standing committees may be elected from time to time by the Board of Regents

5 Eight members of the Board of Regents shall constitute quorum for the transaction of business

6 Regular meetings of the Board of Regents shall occur once in six months on the call of the Secretary Special meetings may be convened at any time by the Secretary or on a request to him made in writing and signed by thirty members of the Board of Governors, or eight members of the Board of Regents.

VII Fellows 1 The Fellows of the College shall be graduates in medicine who are licensed to practice medicine in their respective states and provinces, or medical officers of the federal services, who have made application for fellowship (such application being endorsed by three Fellows of the College one of whom shall be member of the Board of Governors) who meet the qualification requirements that shall from time to time be established by the Board of Regents, and who shall be elected to fellowship by the Board of Regents on recommendation of the Committee on Credentials and who shall have signed the roll

2. Each individual elected to Fellowship in the College shall be designated as a Fellow of the American College of Surgeons and shall be authorized and encouraged to use the letters F A C. S. after his name on professional cards, in professional directories, and in articles published in surgical literature

VIII Fees. An initial fee of twenty-five dollars shall be required of each member of the College on his election to Fellowship by the Board of Regents A fee of five dollars shall be required each year for five years A payment of fifty dollars at entrance shall relieve the member of further payments

IX. Publications. The Board of Regents shall issue each year directory containing the names and addresses of the Fellows of the American College of Surgeons arranged by states, provinces and colonies

X Any member of the College may be expelled for conduct which in the opinion of the Board of Regents is derogatory to the dignity of the College or inconsistent with its purposes Such expulsion must be voted by majority vote of the whole Board of Regents at any meeting, at which meeting the member against whom charges are made shall be invited to be present, and may appear or may be represented, in manner to be determined by the Board of Regents

XI These by-laws may be amended by a majority vote of those present at any regular or special meeting of the Board of Governors, or at meeting called for the purpose on request made in writing by hundred members of the Corporation, provided that such proposed amendments are included in the call of the meeting at which such action is contemplated

OFFICERS

President J M T Finney Maryland First Vice President W W Chipman, Quebec Second Vice-President Rudolph Matas Louisiana, Treasurer Albert J Ochsner Illinois General Secretary *Franklin H Martin, Illinois*

BOARD OF REGENTS

J M T Finney Maryland Albert J Ochsner Illinois Franklin H Martin Illinois George E Brewer New York George E Armstrong Quebec, John B Murphy Illinois Ed ard Martin Pennsylvania, Frederic J Cotton Massachusetts Herbert A Bruce Ontario Charles I Stokes, Washington, D C William D Haggard, Tennessee

George W Crile Ohio, Robert E McKechnie British Columbia Charles H May Minnesota Harry M Sherman, California.

SELECTION OF FELLOWS

It was determined by the organization to admit surgeons t Fellowship under two groupings First, the charter members, consisting of surgeons of distinction and ability who have been in the practice of medicine not less than eight years and who, in the opinion of the Board of Regents, should be entitled t Fellowship without the formality of an examination second those who should be required to submit t an examination or other test of qualification required by the Board of Regents It was decided to limit the time of admission of the first group of charter members to November 914 and to postpone the admission f Fellowship by examination until the Board of Regents had formulated detailed plans of a satisfactory nature for admission by this method, not earlier than November 1 1913

APPLICATION FOR MEMBERSHIP

The Board of Regents at its earlier meetings announced that t would be the spirit of the association to open the fellowship t all competitors in surgery without favor The Board of Regents is anxious to have every surgeon on the continent who can fulfill the membership requirements become a Fellow of the organization The General Secretary is therefore instructed to send application blanks to any legally qualified practitioner of medicine on the American continent who may signify his desire to become member

METHOD OF SELECTING FELLOWS

The by-laws specifically state that the Fellows of the College shall be graduates in medicine who are legalized to practice medicine in their respective states or provinces and who meet the qualification requirements that shall from time to time be established by the Board of Regents

The application blanks are uniform and each applicant for membership is required t file application blank filled out in detail and signed The blank contains the following questions and specifications

Name Address Place and date of birth
What school, academy college or university did you attend Date of graduation Degrees
What medical college or colleges did you attend? Date of graduation Degrees?
In what hospitals have you been an interne, resident or assistant? From ——— to ———?
In what hospitals have you been staff member and in what capacity
In what teaching capacity have you been active?
What other appointments have you had?
What post-graduate studies have you pursued in America and here?
What post-graduate studies have you pursued abroad and here?
What official positions have you held?
How many years in special practice and here?
What department of special practice?
What percentage of your work is surgical?
What research or experimental work have you done?
Of what medical societies are you a member
Give the names of five prominent surgeons as references, at least three of whom are from your own state
Give the names of books and contributions to medical and surgical literature of which you are the author with date and place of publication.

Signed ———

Date ———

The application papers contain a separate declaration against the practice of fee-splitting This is in the nature of a personal pledge and each applicant is required t attach his signature to it and file it with his papers.

REFERENCE BLANK

While the by-laws require that an applicant give three endorsers, the Committee on Credentials now recommend that five names be given, three of which should be from the applicant's own state. The reference blank contains the following questions and answers

Name Address College and date of graduation
How long have you known the applicant?
What is his surgical standing in the profession
3. What is his experience as surgeon
4. How extensively does he specialize?
5 What special training in surgery has he had?
6. What is his moral standing in his community?
7 What is his ethical standing
8. Do you believe he will carry out in practice the spirit of the enclosed declaration
9 Do you believe from your knowledge of the applicant's life that we can accept in good faith his fulfillment of the principles involved in the enclosed declaration if signed by him
Do you believe he is in every way qualified for Fellowship in the American College of Surgeons
Remarks

COMMITTEES ON CREDENTIALS

The Board of Regents has authorized Committees on Credentials consisting of the Central Committee, which reports directly to the Board of Regents, and State and Provincial Committees, which report to the Central Committee on Credentials

The Central Committee on Credentials holds its meeting in the office of the College, where the members can have access t all papers and correspondence filed in connection with each candidate.

The State and Provincial Committees each consisting of from five to seven members, are located in nearly every state in the United States and in four divisions of Canada

DUTIES OF COMMITTEES ON CREDENTIALS

The name of each applicant for fellowship together with the names of his references, is sent by the Central Committee on Credentials to the State or Provincial Committee which has jurisdiction over the territory in which the candidate resides,

and this local committee, after consideration, makes its recommendations to the Central Committee.

When an applicant s papers are complete including a report from each of the references given and from the State Committee on Credentials, the Central Committee on Credentials takes up the *pplication for final consideration* and recommendation

When the candidate has successf lly passed the final scrutiny of the Central Committee on Credentials, he is recommended t the Board of Regents for election to Fellowship If on the other hand, the candidate's papers are found defective or his qualifications are considered below the standard for f llowship required by the College the Committee on Credentials notifies the candidate by the following form letter

Dear Doctor —

Your application to the American College of Surgeons has been considered by our committee on several occasions, but we regret to say that the data submitted are defective to the extent indicated on the accompanying card

So far our committee has had submitted to it over 20,000 pages of material for consideration in connection with the 2000 applications for membership, all of which had to be carefully read, and you can readily see that in order to perform our duties thoroughly we have been compelled t adhere to rules which might seem unreasonably strict, ere we not compelled to do this work in an entirely impersonal manner

We have consequently decided to send this form letter to all applicants whose applications it has not been possible to send to the Board of Regents with our recommendation for election of the applicant. This action is frequently due to the fact that the surgeons given for reference have neglected to send in reports upon which judgment could properly be based

Accompanying the above letter are two cards *Card A" indicating the defect in the credentials or* documents of the pplicant and Card "B" indicating the remedy proposed The status of the applicant's papers are shown by the underscored lines

APPLICATIONS FOR FELLOWSHIP

Over two *thousand applications for fellowship* in the College had been filed up t November 1 9 3 fully one-half of which were voluntary applications Of this number the Committee on Credentials recommended t the Board of Regents 57 for fellowship t the first convocation A large number of the applications *still on file will undoubtedly* be found to represent successful candidates, when they have been considered by the Committee

THE FIRST CONVOCATION

The first convocation of the American College of Surgeons occurred in the Gold Room of the Congress Hotel, Chicago on the evening of November 3 9 3

The prospective Fellows were invited to sign *the roll of membership at this place during the day* The roll was furnished in loose leaf form, and a corps of assistants presided over the formality of signing in manner to make it possible for a large number t be accommodated in short space of time. Each page of the roll was headed by a pledge or contract and to this the Fellow appended his signature nd address.

FELLOWSHIP PLEDGE

Recognizing that the American College of Surgeons seeks to develop, exemplify and enforce the highest traditions of our calling, *I hereby pledge myself* as condition of fellowship in the College, to live in strict accordance with all its principles, declarations, and regulations In particular I pledge myself to pursue the practice of surgery with thorough self restraint and to place the welfare of my patients above all else; to advance constantly in knowledge by the study of surgical literature the instruction of eminent teachers, interchange of opinion among associates, and attendance on the important societies and clinics; t regard scrupulously the interests of my professional brethren and seek their counsel when in doubt of my own judgment, to render willing help to my colleagues and t give freely my services to the needy Moreover I pledge myself, so far as I am able to void the sins of selfishness t shun unwarranted publicity dishonest money-seeking, and commercialism as disgraceful to our profession; to refuse utterly all secret money trades with consultants and practitioners to teach the patient his financial duty to the physician and to urge the practitioner to obtain his reward from the patient openly to make my fees commensurate with the service rendered and with the patient's rights, and to avoid discrediting my associates by taking unwarranted compensation. Finally I pledge myself to co-operate in advancing and extending, by every lawful means within my power the influence of the American College of Surgeons.

ACADEMIC ROBE

After careful consideration of the matter and in view of the fact that important convocations at *hich new Fellowships ill be conferred will occur* each year the Board of Regents adopted distinct fellowship gown which, in their opinion, will add dignity uniformity and academic distinction to the formal gatherings of the College

The gown adopted consists of body of navy blue mohair A scarlet velvet facing five inches wide extends around the neck and down each side of the front The cap is of the same material as the gown, th scarlet tassel

PROGRAM

8 00 *Fello and guests assembled*
8 15 Governors assembled
8 5 Regents assembled with honorary guests
Invocation by the Rev J G K McClure
Presentation of the Roll of Fellows and Honorary Fellow by the Secretary
Conferring of Fellowships by the President.
Introduction of Honorary Fellow individually by the Regents and conferring of Fellowships by the President

CONFERRING OF FELLOWSHIPS

Sir Rickman J Godlee of London was introduced by Regent W W Chipman Before conferring the degree, the President, Dr J M T Finney conferred the candidat and said

Sir Rickman J Godlee student versatile thor distinguished surgeon, worthy member of family whose name is known and honored wherever antiseptic surgery is practiced, President of the Royal College of Surgeons of England, the highest honor within the gift of his professional associates at home His presence here is a renewed evidence of the mutual high regard and esteem held for each other by the t great English-speaking nations

The President then conferred upon Sir Rickman J Godlee an honorary fellowship in the American College of Surgeons

William W Keen of Philadelphia was introduced by Regent George W Crile. Before conferring the degree the President recei ed the candidat and said

William Williams Keen, nestor of American surgery after professional life covering fifty two years As leader of the Jefferson School of Philadelphia he links us with the great professional names of the nineteenth century Army surgeon, teacher operator riter publicist traveler patron of art promoter of the best in higher education, public-spirited citizen recipient of the greatest gifts t American medicine, Honorary Fellow of the Royal College of Surgeons of England and of Edinburgh, he is honored throughout Europe Wherever good surgery is regarded, there he is quoted

The President then conferred upon D William W Keen an honorary fellowship in the American College of Surgeons

William Stewart Halsted of Baltimore was introduced by Regent Charles F Stokes Before conferring the degree, the President recei d the candidat nd said

William Stewart Halsted surgeon, teacher investigator honored t home and broad contributor t the progress of science One of the four distinguished founders of the Johns Hopkins School of Medicine His gifts t surgical t chnique to numerous aluable operations now the standard, and t many great ad nces in surgical physiology and pathology ha brought t him ternational renown Honorary Fellow of the Royal College of Surgeons of England nd of Edinburgh — with admonished vigor he still pursues his aluable career

Following this, honorary degrees re conferred *absentia* (candidates being unable t ttend because of illness) upon J Collins Warren of Boston nd Robert F Weir of New York

FELLOWSHIP DEGREES

Sir Rickman J Godlee President of the Royal College of Surgeons of England as introduced by the President J M T Finney and upon rising, received th prolonged pplause the entire audience rising to greet him Before reading his formal address, he presented a greeting t the American College of Surgeons in the form of an illuminated parchment from the Royal College of Surgeons of England

GREETING FROM THE ROYAL COLLEGE OF SURGEONS

W the Council of the Royal College of Surgeons of England, have heard with much interest of the approaching inauguration of the American College of Surgeons W hereby convey to it our hearty good wishes and express the hope that it may have successful career and fill position beneficial alike to the Profession and to the Community

W cannot forget the important advances in the Science and Art of Surgery achieved by many distinguished Surgeons in the Continent of America during the past, and are proud to have enrolled upon our list of Honorary Fellows the names of some of the most active workers in these fields t the present day

In accepting the invitation for our President to take part in the opening Ceremony we desire t show that ppreciate the intention of the American College t strengthen the bonds that already unite the Medical Profession amongst the English speaking peoples It is sentiment hich alw y meets with cordial response in this Country and it is one which this College will endeavor to support by all the means in its power

I witness hereof ha caused the Common Seal of the College to be hereunt affixed this 9th day of October 9 3

President RICKMAN J GODLEE.
Vice-presidents G H MARTIN.
[SEAL] FREDERIC EVE

Sir Rickman J Godlee then delivered the formal address to the American College This address will be printed in full nd distributed t the Fellows of the American College of Surgeons nd to members of the profession

ABSTRACT F ADDRESS

I the first place t was pointed out that t is difficult for yone, nd especially for people living in America, to appreciat the conditions in England t the beginning of the fourteenth century This as near the end of the middle or dark ges. The military spirit prevailed, science was nder dark cloud, nd medicine as not in advance of ther sciences Surgery was not so much respected as medicine Surgeons indeed were classed with barbers nd for the most part belonged t the Barbers Guild hich w formed in 308 It included those who practiced minor urgery, but the better classes of surgeons held loof and formed themselves int the Guild of Surgeon

Reference as then made t the origin of the guilds in the city of London They ere associations or fraternities of rtisans for the supervision of the crafts and f regulating the hours of labor They became important bodies and lected the Lord M yor and Corporation.

M re than t hundred years later mely i 5 the Barbers Company and the Guild of Sur

geons united and were incorporated as the Company of Barber Surgeons. This company existed another two hundred years, namely until 1745. They exercised extensive control over the surgeons of the country. They gave licenses to practice and sometimes deprived surgeons of their licenses; they supervised the public dissections, which were the only form of anatomical study recognized by law; they appointed lecturers in surgery; possessed a censorship over books, and had other very important duties. The two bodies were, however, incompatible and in 1745 the Surgeons' Company was separated from that of the Barber-Surgeons. In 1800 they were established as the Royal College of Surgeons in London, and in 1843 the name was again changed, by a charter of Queen Victoria, to that of the Royal College of Surgeons of England.

The College of Surgeons had their first quarters in the Old Bailey and later on moved to their present house in Lincoln's Inn Fields. The ancient titles of Master, Governors, and Court of Assistants were changed to those of President, Vice President, and Council. The corporation consisted of the members. In 1843 a new class of members who were called Fellows was formed, from and by whom the Council henceforth was to be chosen instead of being elected by the Council themselves as had been the case up to this date. The first Fellows were chosen from the members, being elected by the Council chiefly from the surgeons, assistant surgeons, and lecturers of the metropolitan hospitals, and they also included representatives of the naval, military and Indian forces. But since that time the ordinary portal for admission to the Fellowship has been an examination — or rather, two examinations — which constitute a formidable and searching test of ability. The class of Members now numbers over 7,000; the Fellows number 580.

Reference was then made to the new American College of Surgeons and to the methods of recruiting its Fellowship. After describing in some detail the examinations above referred to, a contrast was drawn between the English and American Colleges. Some of the other functions of the English College were passed in review, especially that of the discipline which it can exercise over its Fellows and members. In connection with the examination for the diploma of membership, the question of a uniform system of admission to the medical profession was discussed, and in this connection it was pointed out how in England attempts are being made to secure this result.

In conclusion the relations of the Royal Colleges of Physicians and Surgeons in London was referred to, and the opinion was expressed that as surgery advances, the tendency will be for these two great departments of the profession to be drawn more closely together.

PRESIDENTIAL ADDRESS

President J. M. T. Finney then delivered the presidential address to the Fellows of the College. This address will be printed in full and distributed to the Fellows of the American College of Surgeons and to members of the profession. His remarks in brief were as follows:

The highest development of the greatest efficiency along all lines of public service relating in any way to our profession. With this as the keynote, the American College of Surgeons was launched by Dr. Finney on what is thought by all concerned to be a career of usefulness for the public at large. The history of surgery in the United States and Canada, said Dr. Finney, is opened to a new page. When at some future time the historian comes to write on that page the record of events that have led up to this meeting, he will there record the taking of another step in the progress of medicine in general and of surgery in particular in Canada and the United States. What is consummated here tonight is destined to produce a deep and lasting impression upon medical progress not alone in those countries but indirectly the world over.

"The present and future welfare of the profession has been for a long time uppermost in the minds and very close to the hearts of many of us. We have pictured to ourselves in this connection a profession ennobled by men actuated solely by their desire to devote their time and their talents to the relief of suffering humanity; willing, yes, glad at any time, if need be, to lay down their own lives for those of their fellow-men, whose membership should embrace only men of singleness of purpose, unselfish, high-minded, zealous in their efforts to wrest from nature the keys to her many mysteries; men who unconsciously perhaps, in character and conduct, reflect in varying degrees the life and spirit of the Great Physician — a profession free from taint of commercialism or graft, in which there shall be no room for the base, the unscrupulous, the ignorant, or unskilled — in which the test for membership has to do only with character and attainment.

Our hopes and dreams, so long dim, shadowy and unreal, are about in part at least, to assume definite and concrete form. We are assembled here this evening to witness, indeed to assist at, the birth of a new agency for good, both to the public and to the profession — a bid God-speed to this lusty infant, the American College of Surgeons, the offspring of a fruitful union between deep-rooted and praiseworthy desire within the profession to elevate its standard of ethics and efficiency and a lively sense of the urgent and long-felt need of its accomplishment.

The aim of this organization and the reason for its existence lies in its disinterested and unselfish efforts to elevate the standards of the profession, moral as well as intellectual, to foster research, to educate the public up to the idea that there is a difference between the honest, conscientious, well-trained surgeon and the purely commercial operator, the charlatan and the quack, furthermore, that the term "surgeon" means something more than

suave manner a glib tongue a private hospital, a press-agent, and the all too easily acquired diploma, with its accompanying title of doctor The standardization of surgery is absolutely essential to guard the public against such as these, as well as to preserve the honor of the guild itself. So far as the public is concerned it is necessary to protect it from the wolves in sheep clothing, from those who would prostitute their high office for the purpose of gain, from the ignorant and the untrained, from those who by reason of the lack of surgical judgment and skill are incompetent. The American College of Surgeons has been called into being as an active, vigorous, virile protest upon the part of the profession itself against this unhappy state of affairs.

The public and professional minds should therefore be at once thoroughly disabused of any wrong impression that the College is to be run by any one man or set of men, or by or in association with any pre-existing organization for his or their personal gain or aggrandizement. The American College of Surgeons is no surgical trust, no close corporation for the benefit of the few It plays no part whatever in medical politics, it does not interest itself in the advancement of any corporation or group of individuals, nor in any special school or cult of medicine. It stands only for the good of humanity and the uplift of professional standards of morality and education.

Adjournment was followed by a reception of the Fellows and guests by the officers of the College and Sir Rickman J Godlee

PERMANENT HOME OF THE COLLEGE

At the meeting of the Board of Regents held November 13, 913 Franklin H. Martin asked the privilege of discussing th selection of a permanent home for the American College of Surgeons. Dr Martin said: "It is the judgment of your Secretary that the permanent home of the American College of Surgeons should be located in a city other than Chicago. Chicago is already the home of one of the strongest medical organizations in the country and on the grounds of equity alone, another city should have the honor of housing this new and powerful organization — the American College of Surgeons. I, therefore, move that a committee of five be appointed by the President which should have for its object the selection of a permanent home for the American College of Surgeons. I would include in the motion that this permanent home be ready, if possible, for occupancy at the annual meeting in November 19 4, at the end of our first fiscal year The motion was seconded by Dr. John B Murphy

After considerable discussion, Dr J M. T Finney made a statement in which he said Dr Martin had presented his views on the subject to him in a personal interview, and that he, Dr. Finney was convinced in the face of all the facts, that it would be advisable in his opinion to adopt Dr Martin s resolution. A motion was then passed, all members of the Board of Regents present voting in the affirmative.

The President appointed the following committee on permanent home for the American College of Surgeons: C. F Stokes, Chairman, F J Cotton, H. A. Bruce, G W Crile G E. Brewer H. M. Sherman.

FUTURE CONVOCATIONS

The next convocation for the admission of Fellows will be held in one of the eastern cities on Monday evening of the week of the meeting of the American Medical Association. The third convocation and the annual meeting will convene in November 914 the date and place t be determined by the Board of Regents.

FELLOWS OF THE AMERICAN COLLEGE OF SURGEONS

The following list contains the names of the surgeons upon whom fellowships in the American College of Surgeons were conferred at the first convocation on November 3, 1913. More than a thousand applications are in the hands of the Committee on Credentials. These will be considered as rapidly as the documents are completed. Other applications for this Charter Member group will be received until November 10, 1914. Successful candidates will receive their fellowships at convocations to be held in June and November, 1914.

HONORARY FELLOWS

Sir Rickman J Godlee	London, England
William Williams Keen	Philadelphia
William S Halsted	Baltimore
J Collins Warren	Boston
Robert F Weir	New York

UNITED STATES OF AMERICA

ALABAMA

James Norment Baker	Montgomery
Herbert Phalo Cole	Mobile
L W Constantine	Birmingham
John D S Davis	Birmingham
Francis G DuBose	Selma
J N Furniss	Selma
James A Goggans	Alexander City
W T Hendricks	Mobile
L L Hill	Montgomery
Robert Somerville Hill	Montgomery
William R Jackson	Mobile
W M Jordan	Birmingham
S Kirkpatrick	Selma
James Monroe Mayo	Birmingham
William McDowell Martin	Mobile
C A Thigpen	Montgomery
Isaac Lafayette Watkins	Montgomery

ARIZONA

John Elmer Bacon	Miami
E Payson Palmer	Phoenix

ARKANSAS

St. Cloud Cooper	Fort Smith
R C Dorr	Batesville
William N Laws	Hot Springs

CALIFORNIA

Frank C Ashley	Los Angeles
Elliot Alden	Los Angeles
Thomas E Ball	San Francisco
J Henry Barkan	San Francisco
J Mackenzie Brown	Los Angeles
Reinwald Brown	Santa Barbara
Guy Cochran	Los Angeles
Edward T Dillon	Los Angeles
William A Edwards	Los Angeles
H Bert Ellis	Los Angeles
Ernest W Fleming	Los Angeles
Oliver D Hamlin	Oakland
Henry W Howard	Los Angeles
Thomas W Huntington	San Francisco
Charles G Levison	San Francisco
Andrew Stewart Lobingier	Los Angeles
Charles D Lockwood	Pasadena
Granville MacGowan	Los Angeles
A L McClellan	Los Angeles
Frank W Miller	Los Angeles
E C Moore	Los Angeles
M L Moore	Los Angeles
Lewis B Morton	Los Angeles
Henry P Newman	San Diego
Walter B Power	Redlands
W W Richardson	Los Angeles
Leo Joseph Roth	Los Angeles
Henry Howard Sherman	Pasadena
Harry M Sherman	San Francisco
Harold D Sidebotham	Santa Barbara
Rea Smith	Los Angeles
C B Somers	San Francisco
Stanley Stillman	San Francisco
F Dudley Tait	San Francisco
Wallace I Terry	San Francisco
I W Thor	San Francisco
C Von Zwaluwenburg	Riverside
W Francis B Wakefield	San Francisco
James Thomas Watkins	San Francisco
Alanson Weeks	San Francisco
William P Williamson	San Diego
O O Witherbee	Los Angeles

COLORADO

Melville Black	Denver
Leonard F Keiman	Denver
William W Grant	Denver
Thomas J Gallaher	Denver
Edward Jackson	Denver
Walter A Jayne	Denver
Maurice Kahn	Leadville
Lorenzo B Lockard	Denver
Oliver Lyons	Denve
Francis H McNaught	Denver
G roe B Packard	Denver
Charles A. Powers	Denver
Horac Griffin Wetherhill	Denver

CONNECTICUT

Arthur N Alli o	New H ven
George M Burroughs	Danielson
W H Carmalt	New Haven
Carl E Munger	W terb ry
Oliver Cotton Smith	Hartford

DISTRICT OF COLUMBIA

Edward A Balloch	Washington
Rupert Bli	Washington
William Cuna Bordon	Washington
J Wesley Bo Le	Washington
Joseph H B n	Washington
W P Carr	Washington
Virginius Dab ey	Washington
William C Er t o	Washington
H nry D Fry	Washington
Franci Ran all Hag er	Washington
Joseph T er Jo son	Washington
Robert S Lamb	Washington
H W Lambo	Washington
L C Leh	Washington
F ynt Pendel o Mal er	Washington
G B wn Miller	Washington
Joh F Mora	Washington
Luther Halsey Reichelderfer	Washington
Charle W Richardso	Washington
J J Rich rdson	Washington
Ste hr O Rich	Washington
W li Rivers Sm nds	Washington
Willi m F M Sow rs	Washington
Rath b Spr	Washington
Albert I S el	Washington
Cha le I ncis Stokes	Washington
I aac S Sto	Washington
J Fox T mpson	Washington
George H T ft	Washington
Geor T le V ona	Washington
Joh R Wells gton	Washington
Ch rles S Whit	Washington
William Holland Wilmer	Washington

FLORIDA

Norman M Heggie	Jackso ville
Gerry R Holden	Jacksonvill
Carey Pegram Rogers	J cksonville
Raymond C Turck	Ja ksonville

GEORGIA

William E Camp ell	Atlant
F Pinckney Calhoun	Atlanta
William Simpson Elkin	Atlanta
W S Goldsmith	Atlanta
Edward Groves Jones	Atlant
H H Martin	Savannah
Floyd Wilcox McRae	Atlant
Wm Perrin Nicholson	Atlanta
George Hen Noble	Atlanta

IDAHO

W H Carrithers	Moscow
W F Howard	Pocatello
C W Shaff	Lewiston

ILLINOIS

Frank Allport	Chicago
E Wyllys Andrew	Chicago
Frank T Andrews	Chicago
Charles S B con	Chicago
Joseph Bar er Bacon	M comb
Walter S Barnes	Chicago
Charles H Beard	Chicago
Carl Beck	Chicago
Emil G Beck	Chicago
Joseph C B ck	Chicago
W lliam T Belfield	Chicago
Edw rd M Bench	Galena
Frederic A Benlay	Chicago
Arthur Dean Bevan	Chicago
Carl E Black	Jacksonville
Wallace Bla chard	Chicago
C o W Boot	Evanston
Albert I Bouffleur	Chicago
F E Brawley	Chicago
Truma W Brophy	Chicago
C lark n Gra s Bu ford	Chicago
James Burr	Chicago
Henry T Byford	Chicago
William E Casselb r y	Chicago
Howard R Chiblett	Chicago
Robert J Christy	Quincy
William R C rns	Chicago
C rey C lbertson	Chicago
Arthur H Curtis	Chicago
W C Danforth	E anston
Charles Davis	Chicago
Philip Schuyler Doa	Chicago
Joseph B DeLee	Chicago

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Robert Dodds	Chicago
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E. C. Dudley	Chicago
Frederick G Dyas	Chicago
Daniel N Eisendrath	Chicago
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George F Fisher	Chicago
Ira Frank	Chicago
Jacob Frank	Chicago
Lester E. Frankenthal	Chicago
Emanuel Friedd	Chicago
William Fuller	Chicago
Thomas L. Gilmer	Chicago
John Ferdinand Golder	Chicago
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Mark T Goldstine	Chicago
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Allen B Kanavel	Chicago
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Sylvan Kuhn	Chicago
Dean Lewis	Chicago
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John Alexander Lyons	Chicago
G W Mahoney	*Chicago*
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Franklin H. Martin	Chicago
L. L. McArthur	Chicago
George Martin McBean	Chicago
C. Hugh McKenna	Chicago
Frederick Menge	Chicago
Frank D Moore	Chicago
Frederick B Moorehead	Chicago
George Morgantau	Chicago
John B Murphy	Chicago
W K. Newcomb	Champaign
A. J Ochsner	Chicago
Edward H. Ochsner	Chicago
John E. Owens	Chicago
Charles E. Paddock	Chicago
William R. Parker	Evanston
O. L. Pelton Sr.	Elgin
J R. Pennington	Chicago
J F Percy	Galesburg
Nelson M. Percy	Chicago
D B Phemister	Chicago
Norval H. Pierce	Chicago
S. C. Plummer	Chicago
John L Porter	Chicago
H. M. Richter	Chicago
Charles M. Robertson	Chicago
Casius Clay Rogers	Chicago
Edwin W Ryerson	Chicago
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Louis E. Schmidt	Chicago
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J Clarence Webster	Chicago
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William H. Wilder	Chicago
Daniel H. Williams	Chicago
Carey A. Wood	Chicago
Thomas A Woodruff	Chicago
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Charles E Barnett	Fort Wayne
John F Barnhill	Indianapolis
L. D Brose	Evansville
Albert E. Bulson Jr	Fort Wayne
Edgar Cox	Kokomo
Joseph Riley Eastman	Indianapolis
Thomas Barker Eastman	Indianapolis
A. M. Hayden	Evansville
Norman E Jones	Indianapolis
S. C Lemon	Plymouth
Frank A. Morrison	Indianapolis
J H. Oliver	Indianapolis
Hugo Otto Pantzer	Indianapolis
Miles F Porter	Fort Wayne
Marcus Ravdin	Evansville
Maurice I Rosenthal	Fort Wayne
Charles Stolte	South Bend
George K Throckmorton	Lafayette
Ernest de Wolfe Wales	Indianapolis
Edwin Walker	Evansville
Leon J Wallen	Terre Haute
William N Wishard	Indianapolis
Jonathan P Worrell	Terre Haut

IOWA

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William W Bowen	Fort Dodge
David C. Brockman	Ottumwa
Albertus J Burge	Iowa City
Frank Wilson Dean	Council Bluffs
Lee Wallace Dean	Iowa City
G E. Decker	Davenport
David S. Fairchild Sr.	Clinton
David S. Fairchild Jr	Clinton
Oliver J Fay	Des Moines
J T Haller	Davenport
J C. Hancock	Dubuque
Gordon F Harkness	D venport
C. S. Jamt	Centerville
Lawrence W Littig	D venport
Donald Macrae, Jr.	Council Bluffs
William W Pearson	Des Moines
Alanson M Pond	Dubuque
C. E Ruth	Des Moines
Arthur Steindler	Des Moines
John Nelson Warren	Sioux City

KANSAS

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Charles E Bowers	Wichita
John Lillie Evans	Wichita
George Morris Gray	Kansas City
M T Sudler	Rosedale
W S Sutton	Kansas City

KENTUCKY

Irvin Abell	Louisville
Archibald H. Barkley	Lexington
David Barrow	Lexington
Frank Boyd	Paducah
William Cheatham	Louisvill
Louis Frank	Louisville
Henry Horace Grant	Louisville
Granville S. Hawes	Louisville
George A. Hendon	Louisville
John D Jackson	Danville
Arthur T McCormick	Bowling Green
Lewis S McMurtry	Louisville
J Morrison Ray	Louisville
H G Reynolds	Paducah
William Owen Roberts	Louisville
August Schachner	Louisville
J Garland Sherrill	Louisville
Joseph A. Stucky	Lexington
Ap Morgan Vance	Louisville
John R. Wathen	Louisville

LOUISIANA

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Carroll W Allen	New Orleans
J D Bloom	New Orleans
S. M. D Clark	New Orleans
Henry S Cochran	New Orleans
Arthur W de Roaldes	New Orleans
Marcus Feixoold	New Orleans
Herman B Gessner	New Orleans
William Koehlmann	New Orleans
Ernest S. Lewis	New Orleans
E. Denegre Martin	New Orleans
Rudolph Matas	New Orleans
C. Jeff Miller	New Orleans
Frederick William Parham	New Orleans
W M. Perkins	New Orleans
Eppy Milo Williams	Patterson

MAINE

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William Lewis Coulter	Portland
Erastus E. Holt	Portland
Alfred Mitchell, Jr.	Portland

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William S. Baer	Baltimore
Bertram M Bernheim	Baltimore
Joseph C. Bloodgood	Baltimore
John W Chambers	Baltimore
C. A. Clapp	Baltimore
Sydney M Cook	Baltimore
Thomas S. Cullen	Baltimore
John Staige Davis	Baltimore
S. Griffith Davis, Jr.	Baltimore
Samuel T Earle, Jr.	Baltimore
J M. T Finney	Baltimore
William A. Fisher, Jr.	Baltimore
Richard H. Follis	Baltimore
Harry Friedenwald	Baltimore
Archibald C. Harrison	Baltimore
John Mason Hundley	Baltimore
Guy LeRoy Hunner	Baltimore
Howard A. Kelly	Baltimore
Frank Martin	Baltimore
Alexius McGlannan	Baltimore
William E. Mosher	Baltimore
Omar B Pancoast	Baltimore
Walter B Platt	Baltimore
Andrew J V Reik	Baltimore
Henry O Reik	Baltimore
Wm. Wood Russell	Baltimore
Arthur M Shipley	Baltimore
George Walker	Baltimore
J Whitridge Williams	Baltimore

John R. Winslow	Baltimore
Randolph Winslow	Baltimore
Thomas C. Worthington	Baltimore
Hugh Hampton Young	Baltimore

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Harvey Cushing	Boston
Hayward Warren Cushing	Boston
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Lincoln D. Vose	Boston
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Florence W. Duckering	Boston
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Kendall Emerson	Worcester
Homer Gage	Worcester
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Wm. Phillips Graves	Boston
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Walter Clarke Howe	Boston
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W. B. Lancaster	Boston
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Charles Allen Porter	Boston
Edward Reynolds	Boston
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E. P. Richardson	Boston
Jane D. Kelly Sabine	Boston
Charles Locke Scudder	Boston
Ralph Holland Seelye	Springfield
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Mary Almira Smith	Boston
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James S. Stone	Boston
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Philemo E. T. Tisdale	Fall River
F. H. Vermilye	Boston
Richard G. Wadsworth	Boston
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Michigan

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Ralph E. Balch	Kalamazoo
Max Ballin	Detroit
John Norval Bell	Detroit
Clara D. Brooks	Detroit
Roy B. Canfield	Ann Arbor
J. Heyer Carstens	Detroit
Ray Connor	Detroit
Ernest K. Culley	Detroit
Marshall L. Cushman	Lansing
C. C. Darling	Ann Arbor
C. B. G. de Nancrède	Ann Arbor
William T. Dodge	Big Rapids
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Louis J. Hirschman	Detroit
R. J. Hutchinson	Grand Rapids
Frederick C. Kidner	Detroit
D. Nell LaFerté	Detroit
Albert L. Lawrason	Calumet
Howard W. Longyear	Detroit
Walter P. Manton	Detroit
Joshua G. R. Markham	Flint
Theodore A. McGraw	Detroit
Wm. Francis Metcalf	Detroit
William H. Moll	Detroit
Walter Robert P. Nafe	Detroit
Rolland Parmeter	Detroit
Reuben Peterson	Ann Arbor
Frederick W. Robbins	Detroit
C. H. Sample	Saginaw
B. R. Schenck	Detroit
Burt R. Shurly	Detroit
Richard R. Smith	Grand Rapids
Henry N. Torrey	Detroit
Frank B. Walker	Detroit
F. C. W. Wiltse	Grand Rapids

D Emmet Welch — Grand Rapids
Frank C. Witter — Petoskey

MINNESOTA

A W Abbott — Minneapolis
E. H Beckman — Rochester
Alexander R Colvin — St Paul
Walter Courtney — Brainard
W A Dennis — St Paul
Robert Earl — St Paul
Emil S Geist — Minneapolis
Arthur J Gillette — St. Paul
John H James — Mankat
E. S Judd — Rochester
Hannibal H Kimball — Minneapolis
Arthur Ayer Law — Minneapolis
J Warren Little — Minneapolis
Jennings C Litzenberg — Minneapolis
Archibald MacLaren — St. Paul
William H Magie — Duluth
Arthur T Mann — Minneapolis
Charles H Mayo — Rochester
William J Mayo — Rochester
James E Moore — Minneapolis
Horace Newhart — Minneapolis
John H Rietmiller — Minneapolis
Harry P Ritchie — St Paul
William E Rochford — Minneapolis
John T Rogers — St Paul
John L Rothrock — St. Paul
Arnold Schwyzer — St Paul
Gustav Schwyzer — Minneapolis
Charles N Spratt — Minneapolis
Eugene S Strout — Minneapolis
H B Sweetser — Minneapolis
Frank C Todd — Minneapolis
Franklin R Wright — Minneapolis

MISSISSIPPI

Hugh W Gamble — Greenville
B B Martin — Vicksburg
Harley R. Sheppard — Jackson

MISSOURI

Nathaniel Allison — St Louis
T W Bailey — St Louis
Willard Bartlett — St Louis
J F Binnie — Kansas City
Wilbur P Blair — St Louis
John Young Brown — St Louis
Geo de W Calhoun — St Louis
N B Carson — St Louis
J W Childers — St Louis
Maurice B Clopton — St Louis
W T Coughlin — St Louis
Harry Sturgeon Crossen — St Louis
Walter B Dorsett — St Louis
Oscar H. Ebbrecht — St. Louis
W J Frick — Kansas City
Eugene C Gehrung — St Louis
Jacob Geiger — St Joseph
George Gellhorn — St. Louis
Frank A. Glasgow — St. Louis
J D Griffith — Kansas City
J G Hayden — Kansas City
A. E. Hertzler — Kansas City
Howard Hill — Kansas City
Roland Hill — St. Louis
James N Jackson — Kansas City
Ernst Jonas — St. Louis
Walter C G Kirchner — St. Louis
Bradford Lewis — St. Louis
Hanau W Loeb — St Louis
James E Logan — Kansas City
Frank J Lutz — St Louis
F M McCallum — Kansas City
Harvey G Mudd — St. Louis
Fred T Murphy — St. Louis
Clarence M Nicholson — St Louis
Frank G Nipson — Columbia
Archer O'Reilly — St. Louis
John M Perkins — Kansas City
Francis Reder — St Louis
Ernest F Robinson — Kansas City
W E Sauer — St Louis
M G Seelig — St. Louis
William A Shoemaker — St Louis
Selden Spencer — St Louis
Jackson B Taulbee — Joplin
Frederick J Taussig — St. Louis
John H Thompson — Kansas City
Herman Tuholske — St Louis
Paul Y Tupper — St Louis

MONTANA

T Carey Witherspoon — Butte

NEBRASKA

Simon C Bird — David City
C DeWitt Bryant — Omaha
B B Davis — Omaha
Palmer Findley — Omaha
Harold Gifford — Omaha
August F Jonas — Omaha
John Prentiss Lord — Omaha
Albert R Mitchell — Lincoln
H Winnett Orr — Lincoln
Harold P Salter — Norfolk
John E Summers — Omaha

NEW JERSEY

Robert Morrison Curtis	Paterson
W E. Darnall	Atlantic City
Gordon K. Dickinson	Jersey City
Lloyd Emerson	Orange
Charles L. Ill	Newark
Edward Joseph Ill	Newark
Walter B Johnson	Paterson
John C. McCoy	Paterson

NEW YORK

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Fred Houdlett Albee	New York
L. Grant Baldwin	Brooklyn
Gorham Bacon	New York
Samuel Willis Bandler	New York
L. Bolton Bangs	New York
Arthur J Bedell	Albany
A. G Bennett	Buffalo
T Parmele Bevens	New York
W H. Bishop	New York
Dougal Bissell	New York
Joseph A. Blake	New York
J A. Boodle	New York
Arthur H. Bogart	Brooklyn
John Bion Bogart	Brooklyn
Hermann J Boldt	New York
George Emerson Brewer	New York
Wm. Barrett Brinsmade	Brooklyn
LeRoy Broun	New York
Joseph D Bryant	New York
W Sohier Bryant	New York
Henry G Bugbee	New York
Peter A. Callan	New York
Wm. Francis Campbell	Brooklyn
Alexis L. B Carrel	New York
Walter F Chappell	New York
C. H Chetwood	New York
J Bayard Clark	New York
Clement Cleveland	New York
Marshall Clinton	Buffalo
Gerrard H. Cocks	New York
H. C. Coe	New York
William B. Coley	New York
George F Cott	Buffalo
E. B Craigin	New York
H. Holbrook Curtis	New York
William Darrach	New York
Ala Barnes Davis	New York
Henry Beeckman Delatour	Brooklyn
Edward B Dench	New York
Robert L. Dickinson	Brooklyn
C. N Dowd	New York
Arthur B Duel	New York
Warren L. Duffield	Brooklyn
J Clifton Edgar	New York
Charles A. Elsberg	New York
John F Erdmann	New York
Mathias Figueira	Brooklyn
Edwin Howe Fiske	Brooklyn
Ralph R. Fitch	Rochester
Austin Flint, Jr.	New York
M. L. Foster	New Rochelle
Russell Story Fowler	Brooklyn
Lee Mastick Francis	Buffalo
Thomas R. Frazer	Brooklyn
Eugene Fuller	New York
Henry Dawson Furniss	New York
James A. Gardner	Buffalo
Arpad G. Gerster	New York
Charles L. Gibson	New York
J Riddle Goffe	New York
Charles H. Goodrich	Brooklyn
Oxnlow Allen Gordon	Brooklyn
Hermann Grad	New York
Robert H Greene	New York
Ramon Guiteras	New York
Thomas H Halsted	Syracuse
James Athearn Harbar	New York
John A. Hartwell	New York
William H. Haskin	New York
Herman Emil Hayd	Buffalo
Harold N Hays	New York
L. W Hotchkiss	New York
O Paul Humpstone	Brooklyn
Lee M. Hurd	New York
George W Jarman	New York
John Edward Jennings	Brooklyn
Adoniram Brown Judson	New York
Frederic Kammerer	New York
James C Kennedy	Brooklyn
E. L. Keyes, Jr.	New York
Otto G T Kilian	New York
Adrian V S. Lambert	New York
W E. Lambert	New York
J C Lester	New York
J H Lewis	Buffalo
F Park Lewis	Buffalo
Robert Lewis	New York
Howard Lilienthal	New York
William Lusher	Brooklyn
Samuel Lloyd	New York
Earl P Lothrop	Buffalo
W H Luckett	New York
William C Lusk	New York
Matthew D Mann	Buffalo
James W Markoe	New York
C. H. May	New York
Edgar R. McGuire	Buffalo
Francis W McGuire	Buffalo
T J McKee	Buffalo

James F McKernon	New York
S. J McNamara	Brooklyn
Clarence A. McWilliams	New York
Willy Meyer	New York
Aaron Benjamin Miller	Syracuse
Douglas C. Moriarta	Saratoga Springs
Robert T Morris	New York
Henry H. Morton	Brooklyn
Edw W Mullican	Rochester
James G Mumford	Clifton Springs
Francis Weiser Murray	New York
Frank Richard Oastler	New York
Roswell Park	Buffalo
Frederick J Parmenter	Buffalo
S McA. Paxton	New York
Charles H. Peck	New York
Victor C. Pedersen	New York
Edward W Peterman	New York
William Ward Plummer	Buffalo
John Osborn Polak	Brooklyn
William M. Polk	New York
John Wilson Poucher	Poughkeepsie
H. R. Price	Brooklyn
William H. Rankin	Brooklyn
Reginald M Rawls	New York
John Sturdivant Read	Brooklyn
R. G Reese	New York
W Scott Reuter	Buffalo
George W Roberts	New York
Jacques Cortelyou Rushmore	Brooklyn
John D Rushmore	Brooklyn
James Edgar Sadlier	Poughkeepsie
Reginald Hall Sayre	New York
Newton M Shaffer	New York
John L. Sheppard	Brooklyn
Walter Abman Sherwood	Brooklyn
Harmon Smith	New York
Homer E Smith	Norwich
Robert E. Soule	New York
Thomas Bray Speace	Brooklyn
J Bentley Squier,	New York
E. McD Stanton	Schenectady
Douglas Hunt Stewart	New York
George D Stewart	New York
Lewis A Stimson	New York
William L Stoddard	New York
Arnold Sturmdorf	New York
John D Sullivan	Brooklyn
Parker Syms	New York
Henry Lea Taylor	New York
Howard C Taylor	New York
Harry R. Trick	Buffalo
Walter Truslow	Brooklyn
H M Tyson	New York
John van der Poel	New York
Albert Vander Veer	Albany
Edgar A. Vander Veer	Albany
Hiram N Vineberg	New York
John B. Walker	New York
George Gray Ward Jr.	New York
Wilbur Ward	New York
Brooks Hughes Wells	New York
James Nephew West	New York
Richard Ward Westbrook	Brooklyn
Royal Whitman	New York
Nelson W Wilson	Buffalo
George Woolsey	New York
Thew Wright	Buffalo
F W Zinsser	Rochester

NORTH CAROLINA

K. P Battle, Jr.	Raleigh
John Wesley Long	Greensboro
Henry Norris	Rutherfordton
Hubert Ashley Royster	Raleigh

NORTH DAKOTA

James P Aylen	Fargo
R. D Campbell	Grand Forks
Alexander J McCahoel	Minot
L. P Quain	Bismarck
N Oliver Ramstad	Bismarck
Paul Sorkness	Fargo

OHIO

James Fairchild Baldwin	Columbus
Frederick Stewart Baron	Zanesville
Chester B Bliss	Sandusky
Wm Evans Brunner	Cleveland
Frank E. Burtt	Cleveland
Archibald L Carson	Cincinnati
George W Crile	Cleveland
Albert H. Freiberg	Cincinnati
Walter E. Griess	Cincinnati
Joseph Arda Hall	Cincinnati
Rufus Bartlett Hall	Cincinnati
C A. Hamann	Cleveland
Charles Sumner Hamilton	Columbus
H. H. Hines	Cincinnati
J M. Ingersoll	Cleveland
Julius H. Jacobson	Toledo
William E. Lower	Cleveland
Benjamin Bush McClellan	Xenia
B L Millikin	Cleveland
Mark Milliken	Hamilton
Charles L. Minor	Springfield
John Chadwick Oliver	Cincinnati
Joseph Ransohoff	Cincinnati
Charles A. L. Reed	Cincinnati
Benjamin Merrill Ricketts	Cincinnati
Hunter Robb	Cleveland
E. G Rost	Cleveland

ROLAND E. SKEEL — Cleveland
LEWIS FREDERIC SHIPAD — Toledo
MARTIN STAHM — Fremont
WALTER G. STERN — Cleveland
G. V. SUTLER — Columbus
MAGNUS ALFRED TATE — Cincinnati
JOHN A. THOMPSON — Cincinnati
DERRICK T. VAIL — Cincinnati
JOHN MURPHY WITHROW — Cincinnati
JAMES CRAVEN WOOD — Cleveland
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OKLAHOMA

V. L. BIRCH — Oklahoma City
LEROY LONG — McAlester

OREGON

ALVIN W. BAIRD — Portland
ROBERT C. COFFEY — Portland
LUTHER H. HAMILTON — Portland
WILLIAM B. HOLDE — Portland
FREDERICK A. KIDDLE — Portland
ALBERT E. MACKAY — Portland
KENNETH A. J. MACKENZIE — Portland
EDWARD B. McDONNELL — Portland
HERBERT S. NICHOLS — Portland
WM. H. SAYER — Portland
ERNEST A. SOMMER — Portland
FRANKLIN T. TUCKER — Portland

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CHARLES H. FRAZIER — Philadelphia
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V. V. UHLE — Philadelphia
WILLIAM D. V. N LEV ER — Philadelphia
V. O. WERDER — Pittsburgh
HUGH ARCHIBALD WILSO — Philadelphia
JAMES K. YOUNG — Philadelphia
CHARLES EDWARD ZIEGLER — Pittsburgh

RHODE ISLAND

ARTHUR THOMAS JO ES — Providence
JOHN W. KEEFE — Providence
JOHN W. MITCHELL — Providence
CHARLES W. STEWART — Newport

SOUTH CAROLINA

ROBERT S. C THART — Charleston
CYRUS B. E ELY — Greenville
WILLIAM W. FEN ELL — Rock Hill
LeGRAND C. KERRY — Columbia
CHARLES W. KOLLOCK — Charleston

SOUTH DAKOTA

CHILBERT G. FRED C. TT W — Sioux Falls
J. W. F. FERN — Lead
FREDERICK V. S. FFORD — Florence

TENNESSEE

RICHARD ALFRED MILLER BAER — Nashville
WILLIAM T. B ACK — Memphis
W. A. BR — Nashville
LUCIUS E. B RCH — Nashville
ROBERT C. LD ELL — Nashville
MERRY M. C LL M — Nashville

Joseph Augustus Cheek — Memphis
J. C. Elliott — Memphis
Duncan Eve — Nashville
Rufus E. Fort — Nashville
William D. Haggard — Nashville
Battle Maloney — Memphis
John M. Maury — Memphis
W. M. McCabe — Nashville
M. C. McCann — Nashville
S. R. Miller — Knoxville
J. Lawrence Mitchell — Memphis
Frank Dalton Smythe — Memphis
Hilliard Wood — Nashville

TEXAS

James H. Belt — San Antonio
Hugh Woodward Cromer — El Paso
B. Alexander — Fort Worth
Arthur Carroll Scott — Temple
James Edward Thompson — Galveston

UTAH

Samuel C. Bennion — Salt Lake

VERMONT

Lyman Allen — Burlington
William Slack — Rutland

VIRGINIA

Lewis C. Bosher — Richmond
Kemper Brown — Richmond
Joseph W. Carr — Roanoke
Lomax Gwathmey — Norfolk
Charles Hunter Harris — Charlottesville
James H. Hope — Richmond
James Hope — Danville
Charles Bolling Jones — Richmond
Benjamin Rush — Norfolk
Southgate Leigh — Norfolk
William Lamb Matthews — Richmond
[illegible] McCaw — Richmond
Hunter McGuire — Richmond
Kemper Lee Page — Norfolk
Charles Reid Robertson — Norfolk
Hunter Holmes McGuire — Richmond
Thomas Hewlett Willett — Richmond
Walter Reed — Gainesville

WASHINGTON

I. P. Balabanoff — Tacoma
Frederick Brittain — Seattle
R. L. Catterson — Spokane
J. B. Eagleson — Seattle
Charles F. Ellensbary — Spokane
Burt Elmore — Seattle
Robert D. Forbes — Seattle
Charles B. Ford — Seattle
N. H. Goodell — Everett
Alfred J. Hitchens — North Yakima
George M. Horton — Seattle
Wilson Johnston — Spokane
Frederick C. Jones — Seattle
Henry B. Lum — Spokane
C. J. Lynch — North Yakima
J. A. Mickelson — Seattle
James A. Neff — Spokane
F. R. Northrop — Spokane
Guy S. Peterkin — Seattle
Alfred Reginald — Seattle
Walter K. Spellay — Seattle
C. W. Sharpless — Seattle
Hamilton Stillson — Seattle
Miller C. Stuart — Seattle
C. A. Vranes — Spokane
William F. Wait — Everett
Park Weed Welch — Seattle
Harold J. Welsh — Seattle

WEST VIRGINIA

J. H. Edgar Nace — Charleston
William W. Cole — Elkins
C. S. Hoffman — Keyser
Frank Lemon Hupp — Wheeling

WISCONSIN

John M. Dodd — Ashland
Edward Evans — LaCrosse
H. B. Hirschberg — Milwaukee
Charles H. Lee — Milwaukee
John R. McDill — Milwaukee
Peter Peterson — Milwaukee
Chester F. Smith — Milwaukee
Joseph F. Smith — Waukesha
John Lawrence Van Etten — Milwaukee

WYOMING

Charles L. Ingalls — Cheyenne

DOMINION OF CANADA

ALBERTA

Edgar William Allin	Edmonton
Harry G Mackid	Calgary
Frank Hamilton Mewburn	Calgary

BRITISH COLUMBIA

S. Boothell	Fernie
R. B Boucher	Vancouver
Ivan Glen Campbell	Vancouver
Douglas Corbax	Fernie
R. V Dolbey	Vancouver
George S. Gordon	Vancouver
J H. Keho	Cranbrook
Robert E. McKechnie	Vancouver
W B McKechnie	Vancouver
F W. McPhillips	Vancouver
A. S. Monro	Vancouver
Harold Edward Ridewood	Victoria
H. W Riggs	Vancouver
William H. Sutherland	Revelstoke

MANITOBA

William A. Bigelow	Brandon
R. J Blanchard	Winnipeg
B J Brandson	Winnipeg
H. P H. Galloway	Winnipeg
J A. Gunn	Winnipeg
Jasper Halpenny	Winnipeg
G. Herbert	Winnipeg
J E. Lehmann	Winnipeg
N J Maclean	Winnipeg
James E. McKenty	Winnipeg
S. W Prowse	Winnipeg
Wm. Robson Nichols	Winnipeg
R. M. Simpson	Winnipeg
W Harvey Smith	Winnipeg

NEW BRUNSWICK

Alfred Beckwith Atherton	Fredericton
Murray MacLaren	St John
G Clowes Van Wart	Fredericton
Thomas Dyson Walker	St John

ONTARIO

George A. Bingham	Toronto
Geoffrey Boyd	Toronto
Herbert A. Bruce	Toronto
Irving H. Cameron	Toronto
Frederick A. Clelland	Toronto
W E. Gallie	Toronto
R. J Gibson	Sault Ste. Marie
W B Hendry	Toronto
Wm. Warrick Jones	Toronto
Edmund E. Keho	Toronto
W J O. Malloch	Toronto
Frederick W Marlow	Toronto
J A. McCollum	Toronto
B E. McKenzie	Toronto
Walter McKeown	Toronto
Andrew Samuel Moorehead	Toronto
A. Primrose	Toronto
Richard A. Reeve	Toronto
J A. Roberts	Toronto
E. S. Ryerson	Toronto
Wallace Arthur Scott	Toronto
Norman S. Shenstone	Toronto
G. Silverthorn	Toronto
Clarence L. Starr	Toronto
F N G. Starr	Toronto
Hadley Williams	London
David James Gibb Wishart	Toronto
John Wishart	London
A. B Wright	Toronto

QUEBEC

E. W Archibald	Montreal
George E. Armstrong	Montreal
Walter L. Barlow	Montreal
A. L Baity	Westmount
H S Birkett	Montreal
H C. Burgess	Montreal
Kenneth Cameron	Montreal
R. P Campbell	Montreal
W W Chipman	Montreal
John M Elder	Montreal
Frank R England	Montreal
A. McKenzie Forbes	Montreal
A. E Garrow	Montreal
D A Hingston	Montreal
James Alexander Hutchison	Montreal
Wm Hutchison	Montreal
C B Keenan	Montreal
H M Little	Montreal
F A L. Lockhart	Montreal
James T Rogers	Montreal
Fred T Tooke	Montreal
W G Turner	Montreal
Edmond Melchior von Eberts	Montreal

BOOK REVIEWS

Diseases of the Uterus Their Pathology and Treatment By Sir John Bland-Sutton F R C S London Science Reviews, Ltd.

In this small volume the distinguished author treats his subject according to the conventional classification and the clinical phase is emphasized throughout. The relation of fibroids t pregnancy, labor and the puerperium, to uterine carcinoma and to the bladder and ureters are given particular attention in special chapters. Multiparity as an etiologic factor in fibroids uteri is ignored, this pathologic condition being regarded rather as an end product of septic infection, and at that of the long standing Nelsserian type. Adenomyoma is regarded as the product of epithelial overgrowth with a responsive increase of the connective tissue in which the glands are implanted, this being attributed, again to the action of micro-organisms. Pulmonary embolism after abdominal hysterectomy and the relation of thrombosis and embolism to septic infection of the uterus is considered at length. Argument in favor of supravaginal hysterectomy as opposed to total extirpation is ably set forth in the final chapter This operation is regarded as unrivaled among surgical procedures for its ability to amend invalid women by thousands, enabling them t lead useful lives as well as to be companions to their husbands and mothers to their children.

The illustrations are plentiful, for the most part picturing gross pathology Instead of an elaborate and complete bibliography the author has appended to the arious chapters lists of references, many of which serve as milestones indicating the progress in pelvic surgery CARRY CULBERTSON.

The Narcotic Drug Diseases and Allied Ailments. By Geo. E Pettey M D Philadelphia F A Davis Company 9 3

¶ This book is a presentation of the subject of narcotic drug diseases based upon the uthor's wide experience. Throughout the book emphasis is placed upon the conception of drug addiction as being in effect a disease and should be treated as such. It is meritorious monograph in which the conceptions of the author are ecorded in detail. It is of special value in so far as the outlined treatment is concerned, the author having made plain, and pparently very simple, each step in the management of these refractory cases.

Included in the details of treatment are favorite prescriptions, and discussion of the effects t be derived from the use of such drugs as scopolamine hyoscine strychnine, and certain cathartics It is well written, adequately illuminated by case reports, and is for the most part convincing

The book contains a discussion of physical training and dietetics as employed in the treatment of the drug diseases, and also several chapters devoted to a discussion of the literature upon this subject, consisting in excerpts from the writings of other uthors, followed by author's comments," in which these writings are criticized.

CHARLES A ELLIOTT.

Vaccine and Serum Therapy By Edwin Henry Schorer B S M.D St. Louis, C. V Mosby Company 9 3.

Primarily a review of authorities on this very important subject, with a view to bringing more recent discoveries down to date and presenting in a concise manner the later theoretical and laboratory specific diagnosis of serum therapy

The author has been patient and painstaking in giving details as to the laboratory technique in specific diagnosis, therapy and treatment. While parts of the work are extremely theoretical and of interest only to specialists in this line, the general scope makes up a manual that is of much value to the general practitioner as well as the specialist, in every form of medicine and surgery Considerable space is devoted to a discussion f the opsonic index and the importance of opsonin in health and disease. The author has successfully established theoretical and experimental evidence as well as clinical application of the specific treatment of bacterial disease. T accomplish this some space has been given to Infections in general and the theories of immunity with special emphasis to the opsonic theory of immunity

The Modern Treatment of Nervous and Mental Diseases. By American and British uthors Edited by William A. White M.D and Smith Ely Jelliffe, A.M., M.D Ph.D Philadelphia and New York. Lea & Febiger

Volume I of this work is made up of nineteen chapters by as many foremost authors and is a consistent and comprehensive outline of a rational therapeutics of diseases of the nervous system and the mind. In order to better serve its purpose the editors ha e arranged the subject matter so that diseases related etiologically are discussed together and in such a way as t appeal not only to the physician but to the educator the legislator the judge and lawyer the student of criminology immigration, and of dangerous trades in fact, for all who are interested in nervous and mental hygien

The part devoted t syphilis of the nervous system re comprehensiv and hile the therapeutic requirement are held uppermost the rious clinical entities are differentiated et brought together and discussed and ppropriate treatment outlined

Chapter I deals with eugenics in nervous and mental diseases. Chapter III with sexual problems thei nervous and mental relations

Chapter IV with the educational treatment of the feeble-minded

Ch pter VIII w th the treatment of the neuroses, including the psy honeuroses

Chapter XVI with presenile arteriosclerotic and senile disorders of the brai nd cord

The work is decidedly one of preventive medicine and diff rs widely from the ordinary textbook In that it is planned on broad scale and emphasizes the fact that the psy hical side of lif merits quite as much consideration as the physical offering re constructiv factors in social organization nd pplying them t human ills The book is clearly written, comprehensible alike t physician nd lay man whose education has been sufficient t timulat an interest h many eff re H V Por

Parasitic Diseases and Human Welfare By Edward Bagby Vaughan, M D New York D Appleton & Co 9 1

This work is an effective textbook upon the subject of preventive medicine It is excellent and concise presentation of the subject and is a text book that is certain t take prominent place among the standard textbooks of medicine The facts brought together in this olume are derived from di erse and widely scattered sources, from the broad fields of ma y related sciences and being readable and compactl put together in logical sequence form aluable ork for both the student and sanitary officer

Using an excellent textbook style the thor has ill ustrated the subject discussed rich sufficient concrete examples, illustrating the points discussed nd by so doing has not cumbered the book th much of the dead wood so often found monographs treating upon these same subjects

The book deals th broadly diversified, yet properly related subjects, including detailed discussion of the infectious diseases, insect borne diseases, quarantine immunity heredity eugenics epilepsy food, ventilation, public ter supply ge sewage disposal, vital statistics, occupational diseases, disinfection, and many other related subjects, treating them always from the preventive medical standpoint and properly linking them together so as t giv adequat idea of this broad subject

The chapter upon immunity is particularly structiv including discussion of the mechanism of immunity bacillus carriers latency Ehrlich side chain theory the nat re of toxines and toxines, phagocytosis, anaphylaxis, et all bei g presented in textbook manner th main facts being given th didactic precision

The section devoted to foods is comprehensive, although necessarily compact to fit the scope of the book. A general treatment of the hole subject is presented, including a classification of foods, a discussion of dulteration of foods, decomposition, preservation and preparation of foods. The chapter upon milk is short yet adequate, and includes a discussion of milk supply classification, adulteration, diseases spread by milk, and the methods for the examination of milk The chapter upon meat covers discussion of such subjects as the production, preservation nd inspection of meat. The various diseases produced by the consumption of nfected and spoiled meat is thoroughly and satisfactorily dealt with Th subjects of eggs and vegetable supply are dealt with in the same y

The sections devoted t air water sewage and refuse disposal re fitting for the scope of this work Ventilation, heating nd the effect of vitiated air are discussed as well as ter supply the analysis of ter the methods of purifying ter and water and its relation t disease.

These are all subjects which should be taken up in the class room, and t the mind of the reviewer no more compact yet logical and comprehensive text book, f lfilling the requirements of the class room, has been itten. The eminence of the author the logical classification of subjects, and the authoritative manner of presentation stamp this book as textbook of the first order t be considered along th Osler Adams, and others of the endi ng text book that stay throughout the ears.

C ARLE V Ellio

Genito-Urinary Diseases and Treatment By Ernst Porosz M D Translation from the German by Bransford Lewis St Louis C V Mosby C

The title is misleading as the book is intended only t present therapeutic measures in genito urinary diseases Very rarely indeed is any reference made t diagnosis, such reference being made to emphasize certain important points I t translation the book has been so freely edited by Lewis that it assumes the aspect of co authorship The manual is full of brilliant concise instructions in the matter of pre entative palliative and radical therapeutics V space is wasted in reviews of the authorities or the exploitation of theoretical hobbies so common in the medical literature of the present day Brevity has enabled the author t comprehensively treat, in matter of 200 pages the therapy of the entire field of genito-urinary diseases and has left him space to review in separate chapters those genito-urinary diseases of women and children hich present special peculiarities The book is well suited to the needs of the student general practitioner and specialist because of the intensity clarity and brevity of the text

Clinical Congress of Surgeons of North America

FIFTH ANNUAL SESSION

LONDON ENGLAND

WEEK OF JULY 27 1914

CLINICAL CONGRESS OF SURGEONS OF NORTH AMERICA

GEORGE EMERSON BREWER, President
W W CHIPMAN Vice-President
ALLEN B KANAVEL, General Treasurer
FRANKLIN H. MARTIN General Secretary

JOHN B MURPHY President Elect
GEORGE E. ARMSTRONG, Vice President Elect
A. D BALLOU General Manager

THE CLINICAL CONGRESS IN LONDON

It was very fitting that an enthusiastic invitation should come to the Clinical Congress of Surgeons to hold its next session in London at a time when the Congress had shown its popularity by an attendance that taxed the clinical capacity of the three great medical centers of America — Philadelphia, New York, and Chicago.

The London invitation came as the result of a carefully prepared campaign on the part of a number of the leading clinicians of that metropolis, and as the direct outcome of the deliberation of a committee representing the large hospitals and teaching institutions of London

The invitation was delivered in person by a sub-committee consisting of Sir Rickman J Godlee, Sir Arbuthnot Lane and Mr Herbert Paterson. Each of these gentlemen made a short address at the business meeting of the Congress and asked that the next meeting be held in London

Sir Rickman Godlee read the following letter from the Secretary of the London Committee

> A committee consisting of London surgeons, representing our hospitals in London, desires me to ask you to convey to the Clinical Congress of Surgeons of North America the following resolution
>
> That the members of this committee will do everything possible to make satisfactory arrangements whereby the members of the Clinical Congress of Surgeons of North America may see and study the work done by the London surgeons in London
>
> I feel sure that I am only voicing the wish of the members of this committee when I ask you to extend this invitation to the members of the Clinical Congress of Surgeons of North America
>
> (Signed) HERBERT S PATERSON

The London Committee, which has been preparing for the Congress for nearly a year and which will represent the nucleus of the Committee on Arrangements for the Congress consists of representatives appointed by twenty two large clinical institutions in London.

The time selected for the meeting is the week of July 27 1914. This date is propitious from several standpoints It comes at the end of the social season, when hotel accommodations are ample, immediately preceding the vacation season of the London surgeons, at a time when the weather in London is delightful corresponding too to the season usually selected by American surgeons for their own vacations.

PRELIMINARY LONDON COMMITTEE

The representatives selected to act upon the committee for the hospitals in London, and the surgeons from the hospitals extending the invitation to the Congress, are as follows

St. Bartholomew Hospital

Representative Mr McAdam Eccles.

Surgeons Sir A. A. Bowlby Mr D Arcy Power Mr H. J Waring, Mr. R C. Bailey M L. B Rawling, Mr G. E. Gask, Mr C. G Watson Mr G Ball.

St. Thomas' Hospital

Representative Mr Cuthbert Wallace.

Surgeons M G H Makins Mr W H. Battle M C. A Ballance, Mr H. B. Robinson, M E. M Corner Mr P W G Sargent, Mr C. A. R. Nitch

Westminster Hospital

Representative M Walter Spencer

Surgeons Mr C. Stonham Mr W G. Spencer M A. H Tubby, Mr. W Turner Mr A. H Evans Mr E Rock Carling, Mr J M G Swainson.

Guy' Hospital

Representative M C. H. F gre.

Surgeons Sir W A. Lane, M L A. Dunn Sir Alfred Tripp, Mr F J Steward, Mr R. P Rowlands M P Turner M E C. Hughes.

St. George' Hospital

Representative Mr H. S. Pendlebury
Surgeons: M G R Turner Mr I Jaffrey M T C. English M Ivor Back Mr W T Tedden

London Hospital

Representative Mr J Sherren.
Surgeons Sir T E M J Hutchinson M T H Openshaw Mr H P Dea Mr P Furnivall, M R. M Higby, Mr H Lett M Russell Howard Mr R. W rren, M T S. Kidd M R Milne.

Middlese Hospital

Representative Mr T H K Bock.
Surgeons Sir A. T Gould Sir J Bland Sutton M J Murray Mr W S Handley Mr G T ylor Mr A. E. Johnson

University Hospital

Representative Mr R. Johnson
Surgeons Sir Rickman J Godlee M V L J Barker M B Pollard Mr W H L Trotter Mr H M Davies.

King College Hospital

Representative Mr T F Burghard
Surgeons Sir W W Cheyne Mr A B Barrow Mr A. Carless, Mr G L. Cheatle Mr T P Legg

St. Mary's Hospital

Representative Mr W H Clayton Greene
Surgeons Mr J E. Lane Mr V W Low Mr S. M ynard Smith M Duncan Fitz Williams, M V Z. Dope

Charing Cross Hospital

Representative Mr H S. Clogg
Surgeons M Stanley Boyd, Mr H F Water house Mr Chas. Gibbs, Mr P L Daniel

Royal Free Hospital

Representative M James Berry
Surgeons M W H. Evans, Mr T P Legg M J Cunning Mr G Pannett
Ophthalmic Surgeon M H Work Dodd
Gynecologists Mrs V ughan Sawyer Mrs Willey
Throat and Ea Surgeon Mr J G French

Metropolitan Hospital

Representative Mr M ynard Heath
Surgeons M Peter Daniel Mr C G Watson M W Ashdowne M H Curtis, M R. C Elmslie
Ophthalmic Surgeon M E W Brewerton
Gynecologist M H J Playfair

Cancer Hospital

Representative M C. Ryall.
Surgeons Mr W E. Miles, Mr R. H Jocelyn S an Mr J C nning, Mr J H. Evans, Mr Cecil Rowntree Mr H W Wilson

Hospital for Sick Children

Representative Mr G. E. W ugh.
Surgeons Sir W A. Lane Mr T H. Kellock, Mr E. M Corner Mr O L Addison, Mr H A T Fairbank.

West London Hospital

Representative Mr Tyrrell Gray
Surgeon M A. Baldwin, M D Armour M J G. Pardoe Mr H S. Souttar
Ophthalmic Surgeon Mr H. Percy Dunn
Gynecologist Dr Drummond Robinson
Throat Surgeon Dr H J Davis.

National Hospital

Representative Mr Percy Sargent.
Surgeons Sir V Horsley M Donald Armour.

St Peter Hospital

Representati e Mr J Thornton Walker
Surgeons Mr S. F Edwards, Mr. P J Freyer Mr J G Pardoe, Mr J S Joly

Prince of Wales Hospital

Representative Mr H W Carson
Surgeons Mr E Gillespie Mr J Howell Evans
Gynecologist Dr A. E. Giles
Throat Surgeon Mr H D Gillies

Hampstead Hospital

Representative M J Jackson Clarke
Surgeons M J W Thomson Walker, Mr S. A. Boyd, Mr Chas Wood ard Mr G E W ugh, M H Tyrrell Gray
Ophthalmic Surgeon M M L Hepburn
Gynecologist D T E T ylor

St Mark Hospital

Representative Mr P Lockhardt Mummery
Surgeons M C G Watson, M G Anderson, M L E C Norbury M T S Edwards, Mr A. Baldwin

New Hospital for Women

Representative Miss Aldrich Blake
Surgeons Miss Chadburn Miss Garrett Anderson Miss Bolton

TRANSPORTATION ARRANGEMENTS

It has been suggested to the Executive Committee of the Congress by a number of the members that the visit of the American surgeons to London might be made more enjoyable and that the expenses could be reduced to the minimum by appointing representatives to take charge of all transportation arrangements, hotel reservations, etc Acting on this suggestion the Executive

Committee has engaged Mr J P McCann who has had wide experience in such matters, to take charge of this department He will take care of all the details in connection with steamship and hotel accommodations, checking of baggage etc Also under his supervision several attractive itineraries will be arranged for those who wish to travel in conducted tours or excursions, either before or after the Congress, to visit the medical centers on the Continent and in Great Britain itself and also for those who wish to take sight-seeing excursions.

Since transatlantic travel is extremely heavy at that season of the year it is urged upon all those who expect to attend the Congress that they should at once make tentative arrangements, especially steamship reservations. It is expected that the steamship companies will make a substantial reduction in rates on account of the Congress in London. Where reservations are made through this office previous to the official announcement of any reduction in rates, members are assured that they will be given the full benefit of such reduced rates at the time of making the final payment for their passage.

In order to take advantage of any official concessions that may be extended to the Congress, we strongly advise anyone who contemplates attending the Congress in London to make his reservations through this official channel. All correspondence with regard thereto should be sent direct to the executive offices of the Congress, addressed as follows Clinical Congress of Surgeons of North America 31 N State Street Chicago Transportation Department.

THE CHICAGO SESSION OF THE CLINICAL CONGRESS OF SURGEONS OF NORTH AMERICA

The fourth session of the Clinical Congress of Surgeons of North America, held in Chicago November 10th to 15th proved an epoch-maker in attendance and importance of work accomplished The Executive Committee had made provision to care for a registration of three thousand men This seemed ample in the light of twenty five hundred registrations at the great meeting in New York, and the one thousand registrations at the Philadelphia meeting On the Sunday evening preceding the beginning of the Congress it became very apparent that the attendance at the New York meeting and the estimated attendance for the present meeting were to be exceeded by many hundreds It was at once apparent that it was a wise provision that headquarters had been established at two hotels, one for the general surgeons and one for the surgical specialists Some confusion occurred at the beginning of the meeting because of the underestimated attendance, but it was soon adjusted by appropriating another floor of the hotel at which the main headquarters were established The actual registration was 3989 On Tuesday a new method of handling special tickets was decided — a regular coupon form of ticket being provided for the more important clinics. At future meetings this plan will be followed and prospective attendants will have an opportunity of securing special tickets in advance for the principal clinics.

MEETING FOR THE SELECTION OF REPRESENTATIVES

On Tuesday afternoon at 4:00 o clock the members of the Congress met for the purpose of selecting state and provincial representatives to succeed those whose terms had expired. The men were grouped each group representing a state of the United States or a province of Canada.

At this meeting Dr E. A Codman of Boston Chairman of the Committee on Standardization of Hospitals, presented a report, which is printed in full on another page

Following the reading of the report, Dr Thos. D Walker of St. John N B moved that the Secretary of the Congress send a copy of the report to the Committee on Education of the American Medical Association and to the Canadian Medical Association with the statement that the report of Dr Codman s committee is approved by this body This motion was seconded and carried

Dr E. Payne Palmer moved that the Committee on Standardization of Hospitals be authorized to send each important hospital on the North American continent a copy of this report. Motion seconded and carried.

Dr T D Walker of St. John, N B in the absence of the Treasurer Dr Allen B Kanavel, read the Treasurer s report. Accompanying the Treasurer's report was a report of an Auditing

Company the Ernest Reckitt Company which stated that the books of the Congress had been carefully examined and found correct. It was moved and seconded that this report be accepted and the accounts be turned over to the auditing committee for examination and report.

The meeting then adjourned, to convene Friday November 14th, at 4:00 o clock.

ADJOURNED BUSINESS MEETING

Held in the Gold Room of the Congress Hotel, November 14 1913.

The first order of business was the reception of the London Committee, consisting of Sir Rickman J Godlee, Sir Arbuthnot Lane, and Mr Herbert Paterson. The communication presented by this committee will be found on another page.

On motion of Dr Lewis S. McMurtry the invitation to hold the next Congress in London was unanimously accepted.

COMMITTEE ON STANDARDIZATION OF SURGERY

The Secretary reported that the Committee on Standardization of Surgery appointed at the New York meeting had employed its time in organizing the American College of Surgeons. The convocation of the American College of Surgeons held on November 13th was pointed to as the result of the committee's work. Dr Martin urged that a similar committee be continued to co-operate with the American College of Surgeons and other societies of the United States and Canada in furthering the higher standardization of surgery On motion of Dr Herbert A. Bruce of Toronto it was moved that a Committee on the Standardization of Surgery be appointed for another year It was suggested that the personnel of this committee be changed and that a new committee be appointed by the President. The Committee on Standardization of Surgery appointed by Dr George E. Brewer consists of Drs. Lewis S. McMurtry Louisville, Chairman Charles H. Peck, New York City H. P Newman, San Diego Wm. Lewis Cousins, Portland Me Charles S. Davison, Chicago.

REPORT OF CANCER CAMPAIGN COMMITTEE

Dr Cullen, Chairman of the Committee appointed at the New York meeting to make a campaign of education on the cancer problem, then made his report, which will be found on a following page.

Dr McMurtry presented the following resolution:

Resolved, That the Clinical Congress of Surgeons now assembled, has watched with great interest and satisfaction the formation of the American Society for the Control of Cancer We are familiar with the objects for which it was formed and believe there is urgent need for its existence. We know those who are charged with the management of the society, and believe that they will be honest in their efforts and steadfast in their purpose to check, and it is hoped eventually to control, the ravages of that scourge which constitutes the common enemy of all mankind. We pledge our loyal support to the American Society for the Control of Cancer and earnestly commend their efforts to thinking people of all professions everywhere. We further request Drs. Thomas S. Cullen, Howard C. Taylor C. Jeff Miller and F F Simpson to represent the interests of this Congress in the Executive Committee of the American Society for the Control of Cancer for the coming year

A second motion was made by Dr G. Clowes VanWart of Fredericton, N B that the Cancer Campaign Committee also act in co-operation with the American Medical Association and the Canadian Medical Association.

REPORT OF THE NOMINATING COMMITTEE

The Nominating Committee made the following nominations for officers for the ensuing year

Dr John B. Murphy Chicago, President;
Dr George E. Armstrong, Montreal, Vice-President
Dr Franklin H. Martin, Chicago, General Secretary
Dr Allen B. Kanavel, Chicago, Treasurer
Mr A. D Ballou, Chicago, General Manager.

On motion of Dr F F Simpson, the Secretary was instructed to cast a ballot for each of the nominees presented by the Nominating Committee This motion having passed unanimously the Secretary cast a ballot for

Dr John B Murphy President,
D Geo. E. Armstrong, Vice President,
Dr Franklin H Martin, General Secretary
Dr Allen B Kanavel, Treasurer
Mr A. D Ballou, General Manager.

REPORT OF THE COMMITTEE ON STANDARDIZATION OF HOSPITALS

Your Committee on the Standardization of Hospitals begs to present the following report

We have believed it to be the wish of this Congress, that we should examine the ways and means by which this body might best do its share in the general movement which the public is beginning to demand toward increasing the efficiency of hospitals.

We shall presently offer to you three definite suggestions for action by which you may materially aid this important movement, but first we should like to call your attention to the method by which we have approached this subject.

By what standards can we compare hospitals? It is obvious that there are many. There may be a standard of architecture, of cleanliness, of kindness to the patients, of nursing, of medical education, etc. To some persons the per capita cost, the number of patients annually treated, the success in private practice of their medical and surgical staff, the quality of the scientific papers produced, or the up-to-dateness of the laboratories may seem the important elements. Some hospitals seem satisfied with the famous contributions to medical science which some member of their staff made a hundred years ago.

We believe that you will agree with us that even cleanliness, marble operating rooms, famous physicians and surgeons, up-to-date laboratories, and time honored reputation do not necessarily mean that the individual patient will to-day be freed from the symptoms for which he seeks relief.

Even the standard of kindness cannot replace entirely the actual facts of the relief or prevention of symptoms or of the prolongation of life. Nor does a scientific paper written about the autopsy give the patient the satisfaction that a successful operation might have done.

The more time we have spent on this subject, the more obvious it has seemed to us that the only firm ground on which we can compare hospitals is by the actual results to the individual patient. Even a statistical comparison of the results of the treatment of the disease is less satisfactory. A patient operated on at the same sitting for fibroids of the uterus, gall-stones and epithelioma of the nose cannot properly be classified under one of these headings for comparison with other individuals, nor does this combination of diseases form a group frequent enough to tabulate.

A comparison of the morbidity reports of many of the best institutions in this country has convinced us of the futility of the great labor and expense which have been devoted to them. Owing to diversity of methods of classification they are not comparable except in the grossest way. Some are arranged by disease alphabetically, some by regions, and others by elaborate systems modeled after the International List of the Causes of Death.

Our impression of the futility of such praiseworthy efforts without co-operation and co-ordination we have found to be shared by the members of the staffs of even those institutions making the greatest efforts in this direction. We believe that those who compile these statistics would welcome a more simple and direct form. We also believe that it is almost useless for one hospital to undertake statistics of this kind unless other similar institutions adopt like methods.

Since these tables are compiled only from the condition of the patient at the time of discharge from the hospital they are at best a mere rough statement of immediate mortality and do not represent the real result to the patient of the treatment received. Nevertheless, we are convinced that no standardization of hospitals can be fair which is not based on what the hospital is actually doing for its individual patient, and that some form of hospital report must be devised which will show that each hospital is at least making an effort to ascertain whether the results of its treatment are satisfactory or not. From this point of view a successful operation done in a barn is equivalent to a similar one done in an expensive modern operating room. Likewise, one which was unsuccessful because a famous surgeon or teacher was careless or pressed for time is worse than one which failed because the operator was not a member of the American College of Surgeons.

Further personal investigation of a number of the best institutions in the country developed the astounding fact that no effort is made to trace the patient beyond the gate of the hospital except such investigation as is individually made by members of the staff for their own interest. A patient might be operated upon, leave the hospital with the wound healed, and yet no effort be made to record the result of the operation. In other words, we have the paradox that neither the hospital trustees, the physician nor surgeon nor administrator consider it their business to make sure that the result to the patient is good.

A factory which sells its product takes pains to assure itself that the product is a good one, but a hospital which gives away its product seems to regard the quality of that product as not worthy of investigation.

In a way trustees of hospitals who do not investigate the results to their patients do not audit their accounts.

We believe it is the duty of every hospital to establish a follow-up system, so that as far as possible the result of every case will be available at all times for investigation by members of the staff the trustees or administration, or by other authorized investigators or statisticians. We believe that the publication of such material in abstract by case numbers is practical and does not entail a disproportionate expense

The Committee has distributed a leaflet suggesting a form of report based on the idea of a brief abstract of the individual case Such a report would at least be uniform in character and could be expanded indefinitely according to the means of the hospital. It would at least show the essential fact of whether the hospital was making an effort to trace its cases. It would also put its material at the service of medical science in a form much more practical to a statistician than even the best prepared morbidity reports at present published.

If hospitals kept such abstracts in available form, even if not published, we believe that the practical standards of their work would be greatly improved and that a definite basis for the comparison of the efficiency of such institutions would be fixed.

A method such as suggested is t present in use at the Massachusetts General Hospital of Boston and other similar plans are being tried by a few other institutions.

It would be obviously inappropriate for this Clinical Congress of Surgeons to attempt any specific suggestion as to forms of hospital reports. Bodies such as the American Medical Association and the American Hospital Association are more fitted to do this since they represent general medical science and not a special branch.

Your committee has been in touch with the various committees of these associations and has found them already actively working The Committee on Medical Education, of the American Medical Association whose chairman is Dr Bevan has approached the Carnegie Foundation with a petition that it should investigat the efficiency of American hospitals after a similar manner to that in which they recently investigated medical education Since such an investigation would entail great expense and require much time and effort it is unlikely that any unpaid board from the medical profession would be able to conduct it thoroughly It is also probable that such a question of efficiency would best be studied by modern efficiency engineers — not by medical men with preconceived ideas. For these reasons your Committee would favor any action you may see fit to take in adding the petition of this body to that of the American Medical Association and American Hospital Association to broaden the scope of the investigation beyond that of medical education.

As it is highly probable that the Carnegie Foundation will undertake this matter at least so far as it concerns medical education, we may now consider what this Congress can do to aid them.

Representing as you do almost all the hospitals of the country there is much which you may accomplish by a united, or rather a uniform, effort. It is safe to assume that those employed by the Carnegie Foundation will thoroughly investigate such matters as business efficiency laboratory equipment, and the relations of medical education, etc.

It is in matters connected directly with the results of surgical treatment that they will need your help. When you return to your hospitals you can do much to aid the coming Carnegie representative by systematizing the methods which you already use to trace the results of your operations. If you ha e no such system you would do well to get your hospital to establish one now for the demand for it is sure to come In our leaflet we have offered you some suggestions

When a follow-up system is once established it will do much t ward weeding out the superannuated, the lazy and ill-trained surgeons of your community even though they hold high places The delayed misfortunes of the brilliant operators who do not do the right thing will appear from the in nible, and the true surgeon who uses his knife to relieve and prevent suffering will come to his own.

Remember that when the question of efficient treatment comes p it will be the results of the surgeon hich are the easiest to put in the limelight

Your Committee therefore, has to offer the following three suggestions

1 That this Congress gi e the stamp of its approval to an investigation of hospitals by the Carnegie Foundation and empower its representatives to urge the Foundation not to limit its inquiries purely to the bearings on medical educa

tion, but to classify hospitals according to their actual efficiency

II. That each of us do what he can to induce the trustees of his own hospital to organize a follow up system for all patients treated.

III. That each of us do what he can to induce the fellow-members of his staff to appoint efficiency committees who may look into present conditions in his own hospital, in order that we may as far as possible do our own house-cleaning.

Such efficiency committees should be composed of a member of the trustees, a member of the staff and a superintendent.

If tracing the results to the patients is equivalent to auditing the accounts, the trustees should take a hand in it.

In closing this report, your Committee wishes to again state its conviction that the essential factor which will most contribute to raising the standard of American hospitals is the establishment in each hospital of a follow-up system of tracing the outcome of treatment given to each individual patient

We have spoken of a united or uniform effort on the part of the individual members of this Congress, and we urge you in the strongest way to obtain at your own hospitals the establishment of efficiency committees on which the trustees or managers as well as the staff are represented

Let us make this effort uniform. Let us not have the efficiency committee composed in some hospitals entirely of members of the staff but let us aim to have all three of the important branches of hospital management represented so that each may bear in part the burden of the responsibility to the community of the efficient treatment to the individual.

Let it not be said as it may justly be at present, that neither the superintendent nor the manager nor the staff feel it their duty to ascertain whether the product of their hospital is sound or damaged.

Respectfully submitted,

E. A. Codman M. D Boston, Chairman
W W Chipman M. D Montreal.
J G Clark, M. D., Philadelphia.
A B Kanavel, M. D Chicago.
W J Mayo M D Rochester

END RESULT RECORD SYSTEM SUGGESTED BY THE COMMITTEE ON STANDARDIZATION OF HOSPITALS

Each case which goes to the operating room has Surgeon Card which is given to the surgeon to fill out as soon as he is through operating.

After the operation the card goes with the temperature chart to the patient bedside and at his discharge the complication item is filled out and O K d by the surgeon. The card is then given to the librarian, by whom the data on it are neatly transferred to a permanent End Result Card which is filed alphabetically Cases which are not operated on be similar cards made out by their medical attendant

THE FOLLOW UP SYSTEM

Each morning clerk writes routine letter to every patient who was discharged exactly year before asking him to report to the accident room or to reply by letter Notes of these replies are made on the back of the end result cards (By this plan the Massachusetts General Hospital of Boston obtains end result notes for over 50 per cent of the cases)

THE EFFICIENCY COMMITTEE

At present it is nobody's business to see that the hospital patient has good results from his treatment —operative otherwise The trustees leave this question entirely to the staff on the ground that their reputations are above reproach Each member of the staff naturally does not want to call the attention of others to his own bad results, and quite naturally shirks the odium of publicly criticising those of his colleagues The superintendent even if capable of recognizing carelessness or incapacity on the part of the members of the staff especially if they are successful private practitioners, has seldom the power or moral courage to protest.

Therefore it is essential that body composed of members of all these departments should constitute the efficiency committee What has been everybody's business and yet nobody's business will become their business. They should be strong enough to do at least three things.

To call the attention of the staff to their waste products

To gain the concentrated attention of the superintendent

3 To be listened to by the trustees

The trustees must be represented on this committee—possibly by paid agent

Trustees of hospitals who do not investigate the results of their patients do not audit their accounts Even if their product is given away it should be as carefully inspected as if it were to be sold

SURGEON'S CARD
[Size, 8 inches]

Date of Op'n Aug 1 1911

Name Smith John Hosp No. 1022 Ward 28

Cause for relief of Abd pain pyrexia and vomiting of 36 hours duration

Prop Diag Acute Appendicitis Anesthet Gas and Ether

Op'n—Important Points General condition good

Appendix retrocecal-gangrenous ounce of thick pus
Appendectomy and drainage

Post-oper Dia Acute Appendicitis gangrenous with abscess

Compl of Convales None [This means that there was no sepsis, hemorrhage, cystitis, phlebitis, abscess formation or any other complication.]

Dictated by
E M White M D

THE ANNUAL REPORT

To compile an annual report it would be merely necessary to have the data on these cards edited and printed in volume form. Each case would always retain its case number and its abstract would not be repeated in succeeding reports, merely its case number. When a case has once been reported as dead, it would be left off the list entirely.

Examples of the way to edit the annual report from the end result cards. The editing of such report should be in the hands of the efficiency committee.

EXAMPLE OF ROUTINE CASE

(Same case as illustrated on cards)

Case 02 Aug 1st, 9 2. Man—3d. Acute abdom. pain for 48 hours

Op. Appendectomy—gangrenous appendicitis—drainage

Comp.—None.

Result—Sept. 6th, 9 3. No symptoms. Hernia in scar.

EXAMPLE OF CASE WITH MULTIPLE LESIONS AND OPERATIONS

Case 1013 Aug 3d, 1912. Woman—38. Persistent indigestion, dysmenorrhea, metrorrhagia; backache; debility; perineal lacerations.

Op. Plastic repair cervix and perineum. Laparotomy. Removal stricturing appendix. Reposition retroverted uterus (Baldy) cholecystostomy for gall-stones.

Comp. Retention urine; cystitis; sepsis of abdom. fat; phlebitis, protracted convalescence.

Result—Oct. 6th, 9 3. Enough general improvement so that patient is able to do housework but still suffers from many minor symptoms.

EXAMPLE OF A LATE NOTE ON CASE WHICH HAS BEEN ABSTRACTED IN PREVIOUS REPORT

Case 024. Result—Aug. 3, 19 3. Well.

EXAMPLE OF CASE WHICH HAS BEEN ABSTRACTED IN PREVIOUS REPORT ON WHICH NO LATE NOTE HAS BEEN OBTAINED

Case 1015 Aug 1, 9 3 (=date of effort to trace)—No report.

EXAMPLE OF CASE WHICH HAS RETURNED FOR A SECOND OPERATION

(Case on card)

Case 1022 (date of re-entry) Hernia in scar. Op.—Rad cure. Comp.—None. Result—(date)—Well.

Omission of case number would mean that by reference to previous annual report the note of death would be found.

A hospital might make it a rule not to continue reporting a number for more than one year or perhaps five years after discharge. As a matter of fact, the result of treatment is usually obvious for any disease in one year and in nearly all cases in five years.

ESTIMATE OF COST OF EQUIPPING AND MAINTAINING THIS SYSTEM

To introduce it in your hospital you need the money for card catalogues, i about $4.50 per ,000 cards the money for the clerical salaries—one clerk can care for the cards and correspondence of about 7,000+ cases per year also about $100 per 1 000 cases for postage and stationery

END RESULT CARD
[Size, 8 inches]

Name Smith John Hosp No 1022 Age 28 M W	Date of Adm Aug 1 1911	Date of Op. Aug 1 1911	Date of Discharge Aug 17 1911	Re-entry
Address of Pt. 21 Charles St Newton Mass				

Address of Pt's Friends Dr Geo H Brown 36 Oak St Newton Mass

Person Address of Pt's Friends Chas H Wright 47 Chestnut St Watertown Vt

Previous Diagnosis Acute Appendicitis

Post op Diagnosis Acute Appendicitis gangrenous with abscess

Cause for relief of Abdominal pain pyrexia and vomiting of 36 hours duration

Operator Dr E M White

Anesthetic Gas and Ether

Operation Important Facts General condition good Appendix retrocecal-gangrenous abscess ounce of thick pus Appendectomy Drainage

Complications Complications None

Autopsy [This space not necessarily made small so that only the essential facts would be put on here]

[Duplicate of Autopsy Report if Autopsy was held]

If you have an efficiency committee to use these cards as a basis for asking questions, you will save the above expense many times over for it will point out to you where your waste products are.

Every day a patient is delayed by sepsis or other preventable complication—is a waste product.

Every day the patient was in the hospital if the operation or treatment was ineffective or inappropriate—was a waste product

Every day the use of a bed might have been saved by better organization in any branch of the hospital service—was a waste product.

Multiply these by your daily per capita cost.

A review of these cards will enable your efficiency committee to fix the responsibility for these waste products, and if the trustees, the staff and the superintendent are each represented on this committee, it will have the power and machinery to investigate abuses and to correct them.

ESTIMATED COST OF PRINTING THE ANNUAL REPORT PER ,000 COPIES

Cases 1 and 023 are as long abstract as would ever be necessary and the minimum length is represented by cases 024 and 025 Taking these cases as an average and using a page 8x11 ½ inches, the printing of an annual report of 1,000 cases would cost $500, according t the paper and type used, and would make a book of 1 pages each.

It would cost something *but if it were done it could not be said of your hospital that it was nobody's business* to find out the results of the treatment you give your patients.

Hospitals which do not feel that they can bear the expense of printing such an annual report or which do not feel that the publicity of such a report is wise, can merely have it made for their own use in typewritten form. Such hospitals cannot expect to standardize in Class A, but their own knowledge of their errors may give them hope to appear in Class A before many years.

Hospitals which already publish elaborate expensive morbidity reports will find this system less expensive, and those institutions which adopt it will have the additional stimulus of being able to compare their actual results with those of other similar institutions The great municipal public institutions would necessarily appear in less favorable light than endowed or semi-private institutions, bet they could, at least, set a known minimum standard which all other hospitals should excel.

Such an end result report would be useful in the following ways

1. As an alphabetical card index referring t a detailed record of patient.

2. To enable the surgeon to obtain in a few moments the important points and last notes on any case in which he is interested For instance in a coming discussion at a medical meeting he might wish to know the results of his cases of a given disease.

3. To form the basis of a disease region, symptom or operation cross-index system.

4. To take the place of records in those hospitals where none are kept.

5. To save the labor of an elaborate annual report made by complex cross index systems at present founded on no uniform principle

6. A trustee a superintendent or a member of the staff or of the efficiency committee by examining on one day of the week the card of cases discharged during the week and also all notes of end results which have come in during that week, could in an hour keep a constant review of the work of the whole staff of a hospital of 100 bed

7. A member of the staff or some one from another hospital who was interested in a rare disease, such as tumor of the carotid body could have the records searched for such cases with minimum expense It would only be necessary for a clerk to run his eye over the printed abstract report This could be done in a short time even if no cross index system existed

8. Statistics in search of data on a common disease such as cancer could obtain, for instance the percentage of recurrence in operable cases with the utmost ease The reports of the large hospitals, if kept on file in this manner would be of first-class statistical value and if they referred to more elaborate detailed records, so much the better

9. The staff would be constantly advised of the frequency of the various surgical complications such as sepsis, pulmonary infarcts, and cystitis These complications are waste product and are a expense to the hospital equal to the daily expense multiplied by each day of delay in convalescence Attention to this item alone would save many times the expense of this system

10. The medical public and to a measure the general public would be better informed as to the prognosis of the various diseases and operations

11. It would not take the profession so many years to find out that certain operations are or are not worth doing.

12. It would interest the practitioner to inform his local hospital of its successes or failures, and it would in turn inform him as to which of his patients could rightly be cared for at the local hospital without transfer to a medical center

13. It would lead to the specialization of hospitals by legitimate success in different branches and also lead to the retirement of the individuals of the medical and surgical staffs by successful specialization, instead of by being unable to keep up appearances as to knowledge of the constantly increasing number of new facts about all branches

14. If this system were in vogue any one of us who watch the operations at this Clinical Congress could note the numbers of the operations which interested us, and a year from now learn whether real success attended them

15. If this system were adopted by several hospitals in the same city they could easily report to each other the results of migratory cases.

If you see fit to adopt these plans in your hospitals you will raise their standards and also the standards of the medical profession in your communities.

These suggestions can be acted on now perhaps later the A. M. A. or the Carnegie Foundation might ask you to make further improvements but this system was designed especially to permit expansion The principles on which it is founded are basic When the representative of the Carnegie Foundation comes to you, show him that you are making a started effort to trace and record our cases according to plan endorsed by the Clinical Congress of Surgeons of North America

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REPORT OF THE CANCER CAMPAIGN COMMITTEE

So much has recently appeared in the press concerning the value of radium in the treatment of cancer that your committee has deemed it advisable to refer briefly to this subject before describing its activities during the past year

Mr Charles L Parsons of the United States Bureau of Mines sums the matter up so well in his article Our Radium Resources, published in Science October 31 1913 that one can scarcely do better than quote him verbatim

It is to be greatly regretted that owing to the high price of the material only three or four *American surgeons has* so far as the Bureau of Mines is informed, been able to use it in quantities sufficient for the drawing of decisive conclusions In the progress of the future applications of radium to the curing of disease nothing is more to be feared than its use in nostrums of every kind The wonders of radium have been so extensively exploited in the public press that already the name is being employed as a psychological agent in advertisements of all kinds of materials many of which contain no radium at all, or if this element indeed present, in such small quantities that no therapeutic value can be expected As bearing on the need of further experimentation is called to the fact that the *concentrated action of large quantities* of radium may effect cures that have been impossible with the smaller amounts heretofore available to the medical profession It is doubtful if there is at the present time in the hands of the medical profession of America more than a single gram of this rare element and the results of investiga

tions soon to be published will show that the concentrated action of the gamma rays from several hundred milligrams arrest certain forms of cancer and other malignant growths, when smaller quantities are without beneficial effect. It is highly important that the medical profession should also have some guarantee of the material they purchase, even if it is purchased in small quantities and I am glad to note that the United States Bureau of Standards is preparing to standardize radium preparations.

From what Mr Parsons says it is clearly evident that the supply of radium in this country is as yet very limited and that only three or four surgeons in the United States have had sufficient quantities of radium to enable them to satisfactorily test the efficacy of this mineral in the treatment of cancer

In the hands of these surgeons the immediate effects on the cancer have in some instances been wonderful, the growth literally melting away in a few days Some of these patients, it is true, have later succumbed to the disease, but others up to the present time have remained apparently well. Of course these patients must be watched for at least one or two years more before it can be definitely stated that they are cured Only time will tell what percentage of cancer cases can be cured with radium. In the meantime the surgeons engaged in the study of radium strongly advise the employment of surgical means in all cases of cancer in which operation offers a satisfactory chance for a permanent cure

This evening we are to hear from Professor Gauss what has been accomplished with mesothorium in the Freiburg Clinic.

At the New York meeting of this Congress held one year ago it was clearly demonstrated that the laity had a very hazy idea of just what cancer is and how it can be most successfully combated

The following facts were emphasized During the last decade several earnest cancer campaigns had been waged The main object of these had been to point out to the family physician what might be accomplished by early operation and to urge him to send his patients to the surgeon at the earliest possible moment Notwithstanding the splendid efforts in this direction little had been accomplished not because the physicians were necessarily negligent but because the patients did not present themselves to the physician until the disease was far advanced. Hence it was finally realized that if satisfactory results were to be accomplished the message must be carried directly to the people It was pointed out that fifteen or twenty years ago it was very difficult to prevail upon persons with appendicitis to be operated upon now with the knowledge they have, after appendicitis has been diagnosed operation is sought at once, and the only question asked by the patient or his relatives is, To what hospital shall I go?" Similarly as soon as the laity are made fully aware of the cancer situation they will on the first sign of the disease present themselves for examination and will gladly avail themselves of surgical aid.

The Clinical Congress, fully realizing the necessity for immediate action, gave the subject most careful consideration and mainly through the efforts of its secretary Dr Franklin H Martin, a Committee consisting of Dr E. C. Dudley of Chicago Dr C. Jeff Miller of New Orleans Dr F F Simpson of Pittsburgh, Dr H. C. Taylor of New York, and the speaker were appointed.

The Committee was instructed to write, or have written, articles on the subject of cancer and were further instructed to have these published in the daily press and weekly or monthly magazines as might be deemed most expedient. Your Committee has proceeded cautiously and through the aid of that master organizer and medical editor George H. Simmons, was able to enlist the co-operation and support of some of the most representative magazines in the country Mr Bok, editor and Mr Harriman managing editor of the *Ladies' Home Journal* manifested the deepest interest in the campaign. After much thought they came to the conclusion that a lay *writer could* better reach the public ear and they naturally selected Mr Samuel Hopkins Adams, who has proved himself such a dominant factor in the campaign against patent medicines, and who, in June of this year was made an associate member of the American Medical Association in recognition of his splendid crusade. Mr Adams, after visiting various surgical clinics throughout the country wrote a most comprehensive article on the subject which was first published in the *Ladies' Home Journal* for May 1913 It is well worth a thorough perusal not only by every layman but also by each member of the medical profession

Collier's Weekly for April 26 1913 and the May number of *McClure's Magazine* also contained admirable articles on the same subject from Mr Adams pen. The medical profession is under a deep debt of gratitude to Mr Bok, Mr Harriman Mr Collier and Mr McClure for so freely opening their pages for the enlightenment of the public on this very important subject.

It has been estimated that these three articles

reached a reading public of between eight and ten millions. *Harper's Weekly* for March 29th, also contained a timely article urging cancer patients to be operated upon without delay. Abstracts from the magazine articles appeared in many of the daily papers throughout the country. The *Baltimore Sun* contained a full column, the *Baltimore News* and the *Baltimore American* each devoted ample space to the subject. The *New Orleans Item-News* gave a full abstract of Mr. Adams' article from *McClure's* and the *Detroit News Tribune* for Sunday April 27, 1913, with the permission of the *Ladies' Home Journal*, copied Mr. Adams article in full. I have just mentioned a few of the daily papers that have given this matter wide publicity. The entire press of the country has been most liberal in its dissemination of our knowledge of cancer. Nor was this support confined to the papers of the United States. The Canadian journals have also strongly emphasized the necessity that sufferers from cancer should have the condition attended to promptly. I have splendid clippings from the daily press of London, Toronto, Montreal, St. John, N. B., Winnipeg and Vancouver.

Our Committee wishes to express its deep sense of appreciation of the hearty support given it by the press in the dissemination of this knowledge, and feels confident that the press will gladly continue to publish any new data on the subject, until everyone on the continent has a clear idea of just what cancer is, what its early symptoms are, and how it can best be treated.

Our Committee was particularly anxious to find out what influence Mr. Adams' article had had on the community at large and it was not long before data were forthcoming. Within a week after the appearance of Mr. Adams' publication a colleague of mine told me that he had just operated upon a patient for cancer of the breast. The nodule was not larger than a pea and when asked why she had come so early the patient said she had just read the article in the *Ladies' Home Journal* and felt that it was unwise for her to delay. The outlook in this case is excellent. Another colleague had for weeks been urging a patient with cancer to be operated on but to no purpose. Within three days after the appearance of the article, which she had carefully read, she entered the hospital and was operated upon. Dr. C. Jeff Miller of New Orleans, one of our Committee, wrote me that as a result of the article in the *Ladies' Home Journal* a lady soon came to him with an early cancer. Dr. T. C. Kennedy of Indianapolis, under date of May 13, 1913, writes: "A lady out in the state noticed a lump in the left breast. Seeing the article in the *Ladies' Home Journal* she immediately consulted her family physician, who referred the case to me. I operated on her at St. Vincent's Hospital last Thursday doing a Halsted. Here is a case that has a good chance of getting entirely well, as it was taken early."

Dr. Franklin H. Martin of Chicago early in May of this year saw a beginning carcinoma of the breast. The husband had just read the article in the *Ladies' Home Journal* and insisted on his wife consulting a surgeon. Dr. Martin removed the entire breast and axillary glands, and feels sure that the outlook for a permanent cure is excellent.

It is evident, then, that the knowledge of cancer has already been widely disseminated and it is bound to bear fruit. The more the subject is investigated the clearer it becomes that if the women of the country are made aware of what can be done if cancer patients apply early for treatment, it will be unnecessary to pay much attention to the men. If men are sick, unless very ill they pay no attention to it, and only after they are urged by their mothers, wives, sisters or daughters, do they seek medical aid. As a matter of fact the woman is the health guardian of the household.

The campaign of education has, however in reality just begun. It will be necessary to enlighten every member of the community. The problem is a complex one—one that cannot be handled in the same manner that tuberculosis has been. The subject of tuberculosis is easy of explanation. The disease not only affects the individual, but is a real danger to those in the vicinity consequently those in the neighborhood are continually on their guard, and if the patient be not careful in the mode of handling his sputum this laxity is soon brought to his or her attention by those in danger.

Cancer on the other hand, affects chiefly the patient and is of little danger to those around. There is no danger signal such as cough to draw attention to the malady. Of course, if the cancer be on the hand or face it may be noted by others, but as a rule it is hidden, and the patient only is aware of its presence, and her friends do not for a moment suspect the true condition until the patient appeals for medical treatment, or as is too often the case, drifts along until the sallow cachectic appearance accompanying the late stages of the disease clearly demonstrates that the individual is suffering from some dangerous affection.

Much can be accomplished through carefully

written and authoritative articles in the daily press and in magazines but this will not be enough the symptoms of each and every form of cancer must be indelibly impressed upon every individual. For women such information can be most satisfactorily disseminated by women's clubs. These clubs have been rendering yeoman service to the country and their real worth is only now receiving its due share of appreciation. The men of the community can be best reached through short lectures delivered in factories or in the clubs that they may be affiliated with. This heart to-heart discussion on the subject before small companies of men and women is bound to yield results. If such an enlightenment is to be accomplished the entire medical profession must take an active part in the dissemination of this knowledge.

In some cities the people are waking up to the fact that the public school buildings are at most used only about thirty-five hours a week. They furthermore appreciate the fact that if the maximum amount of good is to be accomplished there must be concerted action. In wide-awake communities the schoolhouse has become the evening meeting place of the neighborhood. Here health talks and lectures on hygiene are given and many other topics relating to the welfare of the community are discussed. This practical utilization of the public school building will undoubtedly soon be adopted in all parts of the country and this avenue for the dissemination of the knowledge concerning cancer will then probably be the most important one

The Clinical Congress entrusted our Committee with the initiation of this campaign. Your Committee finds that accurate data on cancer in the United States are very meager If the people of the land are to be enlightened, we must keep better records.

The campaign entails added responsibility on the Clinical Congress of Surgeons of North America With the increased number of cancer patients seeking surgical aid will come a large number of border-line cases—cases in which a careful microscopical examination of the growth must be undertaken to determine whether it is cancer or not. If the growth be malignant, operation is indicated at once. How many surgical clinics throughout the United States are prepared to make frozen sections at once and have at their command an expert surgical pathologist whose opinion can be obtained on the spot? Outside the main centers few possess these facilities, and in many of the hospitals it is days before an expert opinion can be obtained.

Among the many good surgeons throughout the country naturally only a few are surgical pathologists. The time is speedily coming when every hospital will have a trained expert surgical pathologist on its staff a man whose advice can be had at every operation. He will prove to be one of the hospital's most valuable assets. Some may ask why we have not more such men. The truth is that the young physician must make a livelihood and as the pathologist receives, as a rule, a mere pittance for his work, few have the scientific perseverance to enter this field. If the work was made satisfactorily remunerative plenty of capable men could be induced to enter this field and when they have once learned what a fascination there is in following an individual case to its very rock bottom, in obtaining here and there a clue enabling them to forecast with a degree of definiteness and precision whether this or that patient will recover and in discovering every now and then something that has never before been known to medical men, the majority of these men will never give up the study of surgical pathology But it is only fair that these pathologists should be well paid. They are really the judges that pass sentence upon this or that patient. It is they who determine for the surgeon whether a radical operation is necessary or not. It is the duty of this Congress to see that in the near future every hospital has a well trained surgical pathologist attached to its staff Otherwise much of the value of your cancer campaign will be lost.

Your Committee wishes to draw attention to the absolute necessity in every case of cancer of a thorough operation. To accomplish the maximum amount of good for the increased number that will come for operation as a result of our labors, our surgeons must be thoroughly conversant with the anatomy of the parts concerned and must have a full knowledge of the paths along which the cancer travels from its point of origin. In cancer of the lip for example, the operator must consider the removal of the glands of the neck. In cancer of the breast he must be familiar with the lymph glands that are first involved in cancer of the rectum he must remember that the liver is frequently secondarily invaded, and that if such be the case, an extensive rectal operation is contra-indicated.

On one occasion, while in Europe, meeting one of my Baltimore colleagues on the street, I said, Why I thought you were going to Dr ——'s clinic this morning." The reply was, I did. He was to do a breast operation at 8.45 I arrived at 9, and the operation was over This surgeon

has a world-wide reputation If our work is to be as superficial and incomplete as it was in this case then it were better not to undertake any campaign against cancer Fortunately for our patients, admirable work is being done in many clinics, but there are still exceptions.

After results. Hospital management in years past has been notoriously lax, but in recent times business methods have been introduced into many of the newer institutions. It would do all medical men good to visit up-to-date business houses and see the card-index systems and the various short-cut methods employed in everyday business. It would also be advisable for the trustees of the various hospitals to see to it that the same systematic and business-like methods are used in the registration of data in the hospitals with which they are connected as they themselves employ in their businesses.

This is an age of time-saving devices and all business men are keen to see what results have accrued from their endeavors along these lines. What applies to business applies equally well to the subject of cancer What is the use of operating year after year in a routine manner having but a hazy idea of the final outcome At least one tactful clerk in every hospital should be *assigned to the task of keeping in constant contact* with patients who have been operated on In this manner one can at a glance tell how many patients have been relieved by operation. The results of one operator can be compared with those of another—*of course in a fraternal and not* hypercritical spirit for there is no doubt that a runner can always make better progress with a pacemaker The careful analysis of a large number of cases will always demonstrate wherein *future improvements can be made moreover* this strong evidence of the hospital interest in their welfare cannot fail to impress its former patients, and will stimulate them to urge their fellow-sufferers to undergo similar treatment.

These data, to be of use, must from time to time be thoroughly analyzed and published Follow up all your cancer patients, and see what *has become of them Many of them will be dead,* but some that you have lost track of are still *living and well. You will soon become so in*terested in the return letters that you can hardly wait for the postman to arrive and when now and then a reply says that the patient is alive and well at the end of ten or thirteen years, it *will warm the cockles of your heart, It will more* than outweigh many of the disappointing results you have had and will make you feel that after all, the fight is well worth keeping up.

With the increased number of cancer patients coming early for operation the percentage of cures will naturally be increased and with the improved methods of operating this percentage will be still further improved. It is this continual increase in the number of permanent cures that we must keep continually before the public.

Many of the smaller hospitals have difficulty in making ends meet. Such institutions will not be able to furnish funds for the collection of the necessary data on cancer A cancer fund could not be put to better use than in paying the salaries of capable young physicians who would carefully analyze the cancer results of the smaller institutions. If all statistics could be utilized, in a few years the cancer committee would have an abundant and really valuable amount of information on the subject.

Whether the etiology of cancer will soon be discovered or not is problematical, but in any event the people of the country should be made thoroughly cognizant of the early symptoms of cancer and of the fact that many may be cured by early operation. I can imagine no gift that would yield the philanthropist a greater return than the satisfaction of knowing that as a result of his munificence thousands of lives of cancer *patients had been saved by prompt operation*

New workers in an old field are often prone to forget the fundamental labors of pioneers in the same field, and we should be remiss did we not express our appreciation of the labor of those who *in the past have done so much to* bring before the general public a judicious amount of knowledge upon the subject of cancer

In a few words let me give you the message of the Cancer Committee of the Clinical Congress *to the people of America*

Cancer is a very common malady

In the beginning it is a strictly local process and not a blood disease.

It is easily cured when removed early in its *course.*

It is incurable in its later stages.

It is no respecter of race, creed or social distinction.

It is the common enemy of all mankind.

Earnest thinking people in all walks of life must combine to make a determined fight against this relentless foe.

Thomas S Cullen M.B Baltimore Chairman,
E C Dudley M D Chicago,
C Jeff Miller, M D New Orleans,
F F Simpson M D Pittsburgh,
H. C Taylor, M D New York.

SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME XVIII FEBRUARY 1914 NUMBER 2

A PRELIMINARY REPORT ON A SIMPLE AND RAPID METHOD OF PYLORIC CLOSURE IN GASTRO-ENTEROSTOMY

BY GEORGE EMERSON BREWER, M D New York City

Professor of Clinical Surgery Columbia University Attending Surgeon to the Roosevelt Hospital

THE object of this communication is to report and place on record the results of a series of experiments undertaken to determine a rapid and safe procedure by which the pylorus can be temporarily or permanently closed during the operation of gastrojejunostomy Ever since the employment of *gastrojejunostomy in the treatment* of gastric or duodenal ulcer surgeons have recognized the desirability under certain conditions, of effecting *a closure of the pylorus.*

While considerable difference of opinion has prevailed and still *prevails* regarding the advantages of pyloric closure *in the various* conditions in which gastrojejunostomy is indicated and while it is neither desirable nor necessary on this occasion to enter into a discussion of these problems, all surgeons of experience will agree that in at least one group of cases namely in bleeding duodenal ulcers, closure of the pylorus is positively indicated

In the past many methods ha e been suggested *and practiced* to bring about this result The simplest of these is closure by means of a tightly-drawn constricting ligature with or without preliminary contusion of the parts, as suggested by Kelling but unfortunately this has been found to be insufficient, for both animal experiments and clinical observation *in the human subject* ha e proven that the closure thus produced is a temporary one as the ligature quickly causes a necrosis of the constricted area, the proximal and distal peritoneal surfaces brought in contact by the application of the ligature quickly unite and when the necrotic area separates the lumen is re-established. Closure of *the pylorus* by means of infolding sutures, as suggested by Moynihan and Kelling by means of a submucous plastic operation as advocated by Girard by means of a pedunculated seromus*cular flap from the* anterior gastric wall or by a ligature of free transplanted autoplastic material as proposed by Wilms have all been *employed in some instances* with encouraging results. F H Tappeiner however reports a series of animal experiments with all of these *methods. All of his dogs* lived with the exception of one, which died at the end of two weeks from pulmonary embolism.

The specimens from the successfully operated dogs were removed after four seven, and ten weeks.

As a result of a *careful study of these* specimens, the author states that not even a temporary constriction of the dog s pylorus could be accomplished *either with infolding* sutures, according to Kelling s method, with the submucous plastic, according to Girard or with a pedunculated plastic *from the* anterior gastric wall. The same remark ap-

Read the Chair at

Presidential address, Clinical Congress of Surgeons of North America Chicago November 19 1913

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Utter results. Hospital management in years past has been notoriously lax, but in recent times business methods have been introduced into many of the newer institutions. It would do all medical men good to visit up-to-date business houses and see the card-index systems and the various short cut methods employed in everyday business. It would also be advisable for the trustees of the various hospitals to see to it that the same systematic and business-like methods are used in the registration of data in the hospitals with which they are connected as they themselves employ in their businesses.

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In the past many methods have been suggested and practiced to bring about this result. The simplest of these is closure by means of a tightly-drawn constricting ligature with or without preliminary contusion of the parts, as suggested by Kelling but unfortunately this has been found to be insufficient, for both animal experiments and clinical observation in the human subject have proven that the closure thus produced is a temporary one, as the ligature quickly causes a necrosis of the constricted area, the proximal and distal peritoneal surfaces brought in contact by the application of the ligature quickly unite and when the necrotic area separates the lumen is re established. Closure of the pylorus by means of infolding sutures, as suggested by Moynihan and Kelling by means of a submucous plastic operation as advocated by Girard by means of a pedunculated seromuscular flap from the anterior gastric wall or by a ligature of free transplanted autoplastic material, as proposed by Wilms, have all been employed in some instances with encouraging results. F H Tappeiner however reports a series of animal experiments with all of these methods. All of his dogs lived with the exception of one, which died at the end of two weeks from pulmonary embolism.

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Read the Clin ic

Presidential address, Clinical Congress of Surgeons of North America Chicago, November 1913



Fig. — Stomach from dog described in Experiment showing aluminum band completely covered by new formed tissue

plied to thread ligature after contusion of the pylorus, for the ligature is promptly expelled into the intestinal lumen and this is rapidly followed by a re establishment of the pyloric canal. Better results are obtained by thread constriction without contusion of the pylorus, for in these cases a longer time is required for the migration of the thread through the pyloric wall. At the instant however that its transit is completed the pylorus again becomes distended for no solid resistant scar is formed during the experiment.

Still the author states, it should be kept in mind that the muscle of the gastro-intestinal wall is not so strong in men as in dogs, the tissues of which, according to Schloffer

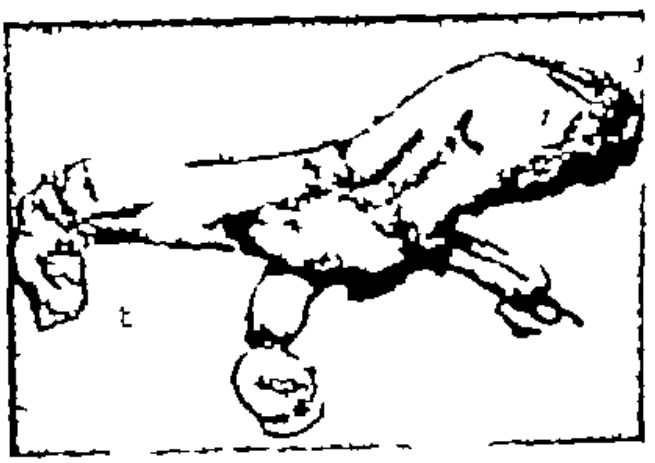


Fig. — Stomach from Experiment [illegible] Aluminum band in place, completely covered



Fig. 3 — Body and pylorus of stomach from Experiment 3 filled with water and tacked to board, pylorus downward, showing no leakage

possess a greatly superior capacity of regeneration and it is possible that the threads take a much longer time to cut through in man as compared with dogs. Still better results are accomplished with the free transplanted strip of fascia for this does not pass through the stomach wall but forms organic adhesions with it. Moreover ligature with the strip of fascia can be completed almost as rapidly as with an ordinary thread, certainly much more rapidly than the gastric wall plastics.

As early as 1895 von Eiselsberg devised and practiced an operation which he designated *exstirpation pylorique exclusion*. This consisted in a complete transverse division of the stomach proximal to the pylorus, and closure of the proximal and distal openings by Lembert sutures. This operation was originally devised to prevent irritation of inoperable carcinomatous ulcers of the pylorus by totally excluding from them the gastric secretions. Later he and his followers employed it in benign ulcers of the pyloric region as well as in ulcers of the duodenum.

That this method is universally successful is evidenced not only by von Eiselsberg's statistics, but by those of Haberer and others



Fig. 4. Pyloric end of stomach filled with ter show ing no leakage from duodenum

In the closing paragraphs of Tappeiner s report the author remarks that he ' believes himself justified in stating that the very best method of pyloric closure is undoubtedly the method of von Eiselsberg although he recognizes certain disadvantages in this often prolonged procedure

While all surgeons will agree that the meth od of von Eiselsberg can be relied upon to effect permanent closure in every instance it will also be recognized that the procedure is necessarily a long one and especially in cases of bleeding duodenal or gastric ulcers the patients are in no condition to withstand the added shock of such an operation Moreover there must also be considered the risk of in fection where the gastro-intestinal tract is thus opened a second time

Stimulated by the successful results of Halsted in effecting closure of the larger arteries by means of aluminum bands, the writer undertook a series of experiments in the Surgical Research Laboratory of the College of Physicians and Surgeons, to deter mine if this method could not be employed in pyloric closure

Advantage was taken of the classwork in operati e surgery and days were chosen when the operation of gastrojejunostomy was dem onstrated



Fig. 5. Stomach from Experiment 4, fter removal of band

As soon as the anastomosis was completed the pylorus was exposed and a closed Kocher s forcep passed beneath the pylorus through the mesentery The forceps were next opened to enlarge the mesenteric rent and a strip of sheet aluminum 1 cm. in width and about 5 cm. in length was drawn backward with the forceps through the mesenteric opening This was next rolled with the fingers snugly around the pylorus with sufficient compression to obliterate its lumen The abdomen was then closed by layer suture The application of the band in this manner took less than a minute and while it effectively closed the pylorus, did not compromise the vitality of the tissues, as the following record of the experiments will show

Experiment Laboratory \ 75 After a posterior gastrojejunostomy by the suture method



Fig. 6. Trans erse section of restored pylorus, Experi ment 5.

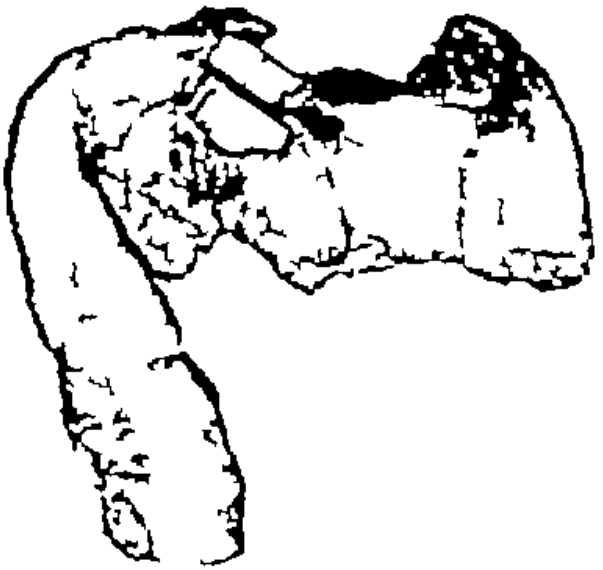


Fig 7 Stomach from Experiment 6 showing aluminum band only partly hidden by new formed tissue Band applied over prepyloric pylorus Dog killed on ninth day after operation



Fig 8 Stomach from Experiment 7 Band covered

an aluminum band was passed around the pylorus by the method just described and tightly molded into a circular constricting ring Abdomen closed by layer suture dressing applied and the dog placed in the hospital A marked reaction followed the operation, and the dog was discharged to the kennels in three weeks Two months and ten days from the operation the animal was killed Autopsy showed the band to be completely covered by newly formed tissue with but few adhesions Stomach and portion of the duodenum with the ascending and descending portions of the jejunum, removed and



Fig 9 Stomach from Experiment 8 Band incompletely covered after seven days

freed from omentum Fig shows this specimen as it was removed at autopsy

Experiment Laboratory No 76 After gastrojejunostomy band applied to pylorus in same manner as in experiment No untoward symptoms during convalescence Dog discharged to kennels at five weeks Two months and ten days later dog killed Autopsy showed band completely buried and invisible Few adhesions Fig represents the stomach after removal and after the attached omental tissue was dissected away

Both of these specimens were preserved intact for laboratory demonstrations

Experiment 5 Laboratory No 77 Same procedure as in other two experiments Dog died on the fifth day of pneumonia Autopsy showed no evidence of peritoneal infection Band completely covered and invisible Small dark area just distal to band on anterior surface of duodenum thought to



Fig 10 Stomach from Experiment 9 Band about stomach removed at second operation



Fig



Fig

Fig Section through pyloric antrum fter removal of aluminum band at second operation, showing lumen restored, Experiment 9

Fig Transverse section of occluded pylorus, aluminum band in place Experiment 3



Fig 3



Fig 6

Fig 3 Transverse section of occluded pylorus, aluminum band in place, Experiment 4

Fig 6 Gross appearance of pylorus closed by aluminum band, from proximal or stomach side Experiment 3

be necrotic, but on microscopi section and examinat tio found t be simply small subserous ecchymoses After removal of the omental thesse and ligatio of the ascending and descending loops f the attached jejunum, the fundus was cut cross and the viscus filled th w ter t see if any leakage through the closed pylorus could be detected. The closure was found t be complet

Experiment 4 Laboratory \ 78 Same procedure as in other animals Dog died on nineteenth day from gastric dilatation Autopsy showed band completely covered and invisible. Distal loop of jejunum bstructed by al lik fold f mucous membrane Stomach dilated and partly filled with cloudy fluid After removal of th stomach from the abdomen, it was cut across bout cm proxi mal t the pylorus The water test as described in the last experiment was pplied \ fluid escaped from the duodenal opening Figs 3 and 4 represent these specimens filled ith ter t ked t board, duodenal extremity dow ward showing no leakage

Experiment 5 Laboratory \ 300 Pylori band pplied in other animals \ reaction Dog remained well sixty seve days, when second operation was performed. Abdome reopened, band found completely hidden by newly f rmed tissu This was incised and the band easily removed. Abdomen closed by layer suture \ reactio following the second operation, the dog was discharged t the kennels in eleven days. Several days later dog killed. A topsy showed pylorus pparently patent. Stomach removed and freed of mentum

Fig 5 represents posterior view of stomach after removal Pylorus cut through showing restoration of lumen with no evidence of necrosis of mucous membrane or muscular coat at site of previous constriction Fig 6 represents cut section through the now open pylorus

Experiment 6 Laborat ry No. 30 Sam procedure w th the exceptio that band was applied t pyloric antrum about cm proximal to pylorus Somewhat heavier material used and more force pplied t effect constriction. Dog suffered from



Fig 4 Microscopic section of closed pylorus in Experiment 3 (low power)



Fig 5 Microscopic section (higher power) Experiment 3

distemper and was killed on ninth day. No peritonitis. Band partly covered. Superficial wound of stomach by edge of band in repair. Complete stenosis demonstrated by water test (Fig. 7).

Experiment 7. Laboratory No. 39. Pyloric band applied in usual manner. Dog became ill and died with signs of sepsis. Autopsy showed pneumonia and peritoneal exudate but no sign of leakage. Band completely covered. Dark area near band due to subperitoneal ecchymosis (Fig. 8).

Experiment 8. Laboratory No. 393. Stomach antrum occluded by band as in Experiment 6 1 cm. from pylorus. Died in seven days of pneumonia. On autopsy band was found only partly covered by new tissue. No signs of necrosis (Fig. 9).

Experiment 9. Laboratory No. 435. Anterior gastro-enterostomy. Band applied about 2 cm. proximal to pylorus. No untoward symptoms followed, and fifteen days later the abdomen was reopened and the band, which was completely hidden, was removed as in Experiment 5. No reaction followed the second operation. Dog subsequently killed. Autopsy showed pylorus apparently open and free from sign of pressure necrosis.

Fig. 10 shows anterior view of this stomach after removal. Fig. 11 shows cut section through previously constricted area.

The stomachs in Experiments 3 and 5 which had been proven to be occluded by the water test were further examined by sawing through the band and occluded areas. Figs. 12 and 13 show the appearance of the cut surfaces and Figs. 14 and 15 the microscopic appearances from sections cut after removal of the aluminum band from the tissues.

These sections show no evidence of necrosis of the mucous, submucous, muscular or serous tissues. Fig. 16 shows the gross appearance of the occluded pylorus viewed from the proximal or stomach side.

A review of these experiments will show that the aluminum band produced a mechanical closure of the pylorus in every instance; that in every experiment in which the animal lived more than nine days the band was completely embedded in newly formed tissue and invisible; and that in none of the animals did the application of the band give rise to necrosis of the compressed tissues, signs of irritation or leakage.

NEOPLASMS OF THE RENAL PELVIS WITH ESPECIAL REFERENCE TO TRANSPLANTATION IN THE URETER AND BLADDER

BY WILLIAM E. LOWER, M.D. CLEVELAND, OHIO

PRIMARY tumors of the renal pelvis are very rare. Watson and Cunningham (1) report that Israel found only 2 cases of kidney pelvis tumors as compared with 68 in the kidney parenchyma, and that there was but one tumor (a papilloma) in 94 cases of renal and perirenal growths recorded at the Massachusetts General and Boston City Hospitals in 10 years. In 1904 Albarran and Imbert in their book, Traité des Tumeurs du Rein, found only six instances in all of the literature on the subject. Stusser (2) in 1912 reported a considerable number of tumors of the renal pelvis and a small number in which the ureter and bladder were also involved.

To the number of recorded cases in which there was transplantation into the bladder I desire to add another which came under my observation within the last year.

An unmarried woman, 63 years of age, was referred to me by her family physician, Dr. I. J. Wright, on August 5, 1909, because of hematuria.

Family history. Father died at the age of 84, mother at age of 83. The family history was negative for cancer, tuberculosis and goiter.

Personal history. She has had the usual diseases of childhood. Scarlet fever at age of 6. Never had typhoid fever or pneumonia. General health has been good until within the last three or four years. She has had no cough, generally good appetite. Has had two gastro-intestinal upsets. Menses began at age of [illegible], have always been regular and not painful. Menopause at age of 53. Has had no vaginal hemorrhage since. Five years ago patient strained her back in lifting. Following this she had considerable pain and soreness in back, which gradually grew worse.

Present illness. For the past three years patient has passed bloody urine at various times. The first time she noticed the bleeding was after an acute retention caused by a large blood clot which obstructed the urethra. She has lost considerable blood in the past three years. Has had some dull pain in the back; this was perhaps more noticeable in the region of the left kidney. At the time of examination she was quite pale and [illegible].

Physical examination showed a well nourished person with rather white skin, mucous membranes pale but free from scars, eruptions or pigmentations. Vision was poor in the left eye; pupils were equal and regular and reacted to light and color. Some slight enlargement of the submaxillary and submental glands. No tumors palpable in the breasts. Lungs were resonant throughout and showed good excursions at the bases. Precordial area did not bulge and no thrills or friction rubs palpable. Heart about normal in size and the sounds were distinct; no murmurs discernable. Pulse was regular, rhythmic and of good volume, 90 per minute. No apparent enlargement of the liver. Both kidneys were palpable and the left somewhat tender. Extremities were symmetrical and reflexes active.

Cystoscopic examination. Bladder capacity 150 ccm. Introduction of the cystoscope easy. Situated just to the left of the left ureteral orifice was a dark tumor mass about the size of a hickory-nut. Upon closer inspection this was apparently an organized blood clot. It was adherent to the mucous membrane and could not be detached by the beak of the cystoscope.

After observing the rest of the bladder which was found free from growth, stone or ulcer, and then reinspecting the tumor, a small amount of blood was seen upon the mucous membrane at that locality. My first impression was that the bleeding came from the base of this clot, but after a little longer inspection blood was seen to be spurting at irregular intervals from the left ureteral orifice. The urine from the right ureter was clear. The diagnosis of left renal hematuria was established but the exact cause undetermined. An exploratory operation was advised but declined at this time. As there was a possibility of this being a so-called essential hematuria, injections of serum were recommended. The patient returned to her home and I heard nothing more from the case until October 19th, when she returned stating that she had been bleeding more or less continuously since her previous visit. She had had several injections of the serum without any definite benefit. Had lost considerable in weight and seemed paler and much more feeble than at the previous examination.

She was sent to the Lakeside Hospital and on October 21st another cystoscopic examination was made.

At this time the bladder capacity was 300 ccm. Introduction of the cystoscope easy. The dark tumor which had been observed at the previous examination was still present and it was plainly to be seen that this blood clot was adherent to a growth, only a small part of which was visible beneath the clot. In addition to this tumor which had been observed at the previous examination, there was another growth about one-half the size of the larger tumor situated upon the other side of the

Read before the American Association of Genito-Urinary Surgeons, Washington, May 1913.



Fig. — Growth in bladder removed at time of first operation.

left ureteral orifice about one-quarter of an inch from the opening, as shown in Fig. This was papillomatous in appearance, and was not bleeding. The ureters were catheterized, urine flowed freely from the right side, but only a small amount of turbid urine was obtained from the left side. Phenolsulphonephthalein intravenously appeared on the right side in three minutes and at the end of fifteen minutes 55 per cent was recovered. At this time there was no discernible bleeding from the ureter nor from either tumor. X-ray pictures of the kidneys and ureters were negative.

From the history of the case and from the previous examinations there seemed to be evidence enough to warrant an exploratory operation on the left kidney before undertaking to remove the tumors from the bladder, although there remained some doubt as to whether or not it might have been mistaken in the source of the bleeding. The tumors in the bladder were sufficient cause for the hematuria, and yet the length of time that the patient had observed blood in the urine, the slight tenderness in the region of the left kidney, and the appearance of the second tumor since the first examination led us to speculate on the possibility of a tumor of the renal pelvis with transplantation into the bladder.

Operation. — As she had stopped bleeding the operation was delayed for a number of days, hoping that she might gain some in strength and be a better operative risk. Her hemoglobin at this time was 60. On October 26th, under gas anesthesia with local infiltration of novocaine, the usual oblique incision was made for the exposure of the kidney. The kidney was found to be somewhat enlarged and the pelvis very much distended (Fig.). Palpation did not reveal any concretions or solid tumor, but a doughy mass could be detected. We did not consider it advisable to open the kidney pelvis lest it might infect the wound with the contents. The kidney was removed and the ureter ligated at a point about 3 inches from the kidney. At the point of division of the ureter there was no evidence of growth. The wound was closed with chromic catgut and the small cigarette drain inserted.

The patient was then placed upon her back and slightly in the Trendelenburg position. A transverse incision was made above the pubes, the recti muscles separated, the bladder exposed and opened. The tumor containing the organized blood clot at the base of which was a papillomatous growth was removed. It was about the size of a filbert. The point of excision was sutured with no. 0 chromic catgut.

The other tumor was much smaller and much softer. It was removed in a similar manner and the wound closed. No other evidence of tumor was found anywhere in the bladder. The opening into the bladder was completely closed without drainage. The patient stood the operation well and there was no change in the pulse rate.

Post operative history. — On October 30th the wound was inspected and the drain removed from the kidney wound. It was clear and apparently healed by first intention. Patient was comfortable and voiding easily. The urine was bloody. On the 30th the clips holding the skin were removed. Patient was still passing bloody urine. This was difficult to account for but thought to be due to bleeding from the base of the tumors which had been removed from the bladder. On October 31st urine was still bloody. Bladder washed with boracic acid and adrenalin solution injected. November 3rd hemorrhage from the bladder very slight, general condition of the patient good. She was discharged November 5th in very good condition and feeling very comfortable. On January 1913 patient telephoned me from her home in a near by city that she was again having hemorrhage from the bladder. She reported at the office on the 3rd. She had gained considerably in weight, her color was much improved and she stated she felt better than she had for a number of years.

Cystoscopic examination. — Bladder capacity 300 cm. Introduction of the cystoscope easy. Extending from the right ureter and folding back on each side was a growth (Fig. 3). It was evident that this growth came from within the ureter and seemed to be pushing down and out of the ureteral opening as shown in the illustration. It was quite apparent that the ureter was involved and second operation advised for its removal. She returned to the hospital and on January 28, 1913, was again operated upon under nitrous oxide anesthesia and novocaine infiltration.

Incision was made extending from the lower end of the old scar through which the nephrectomy had been done, uniting with the scar for removal of the bladder tumors. The ureter was dissected from this scar bow and completely isolated to the entrance to the bladder and part of the bladder excised as shown in Fig. 4. Bladder was closed and small drain inserted down to the point of excision of the



Fig. Photograph of kidney showing distended pelvis

growth in the bladder. In removing the part of the bladder around the ureteral orifice the peritoneum was opened accidentally and immediately closed with plain catgut.

Cystoscopic examination No. 4. February 14, 1913. Bladder capacity 300 ccm. Around the region of the former ureteral orifice was a small mass of scar tissue and some inflammatory tissue. At the bottom of the bladder were a few small hemorrhagic spots, otherwise the bladder mucosa seemed perfectly normal. Upon vaginal examination a small mass could be palpated in the region from which the left ureter had been removed. The mass was slightly tender and seemed to be inflammatory rather than a recurrence.

Cystoscopic examination No. 5. March 6, 1913. Bladder capacity 300 ccm. In the region of the former ureteral orifice there was only a contracted scar; the oedema which had been present at the previous examination had entirely disappeared but there still remained a number of these small hemorrhagic spots. The exact nature of these could not be definitely determined but there was a strong suspicion that they might be the beginning of recurrence.

Cystoscopic examination No. 6. April 9, 1913. At this time the bladder held 50 ccm and situated just behind the trigonum near the area of excision of the left ureteral orifice was a small tumor mass. This was cauterized with the high frequency current on April 3rd, and again on April 8th and 9th. At this time the bladder seemed to be in nearly normal condition, with almost entire disappearance of the tumor there remaining only a white slough at the site of the growth. The pathologic report of the growth in the kidney pelvis, ureter and bladder was identical, all three being malignant papillomas, as shown in Figs. 5, a, b, and c.

At this writing there is no evidence of recurrence of the growth in the region of the kidney or ureter. I am inclined to believe that the tumor at no time had gotten outside of the mucosa.

Upon opening the kidney pelvis it was found to contain considerable amount of broken down material with fringed edges along the calices, as shown in shaded part in the diagrammatic illustration (Fig. 6). The ureter contained a number of patches of the growth, but greater in abundance near the lower end of the ureter where they seemed to pile up at the constriction of the ureter to the bladder.

Microscopic section of the ureter at the point of excision of the kidney was free from any evidence of growth.

No definite theory is advanced for the cause of these neoplasms. Albarran and Imbert (3) found that in 15 per cent of their cases calculi were present and concluded that they had produced chronic irritation and thus furnished a good field for the neoplasms



Fig. 3. Growth in bladder removed at second operation

They usually occur between the ages of 40 and 60 years and are more frequently found in men

As for the symptoms they are quite variable and depend as a rule upon the stage of development Hæmorrhage tumor pain and clements in the urine generally indicate that a growth is present The first sign is usually hæmorrhage It may be continuous intermittent and occasionally cases are noted in which it is absent entirely It may also vary in amount at times being scarcely noticeable and then again so profuse as to cause death Cumston (4) noted that in cases of intermittent hæmatonephrosis one could usually suspect tumor of the renal pelvis He also observed that when there is hæmaturia without retention it points as a rule to a growth in the upper part of the renal pelvis or calices and large hæmatonephroses usually indicate neoplasms in the renal pelvis close to the ureteral orifice

Pain is not a constant symptom nor an important one It may come in attacks of colic unexpectedly and occasionally there is merely a sensation of numbness in either the opposite leg or in the loin and leg of the same side Hartmann (5) reports a case of a man 51 years old who had suffered almost continuously with renal pains since his twentieth year Another instance of long renal colic duration is Oralson's (6) case It concerns a woman 50 years old (at the time of report) who complained of violent renal colic from her twenty-second to her fortieth years The

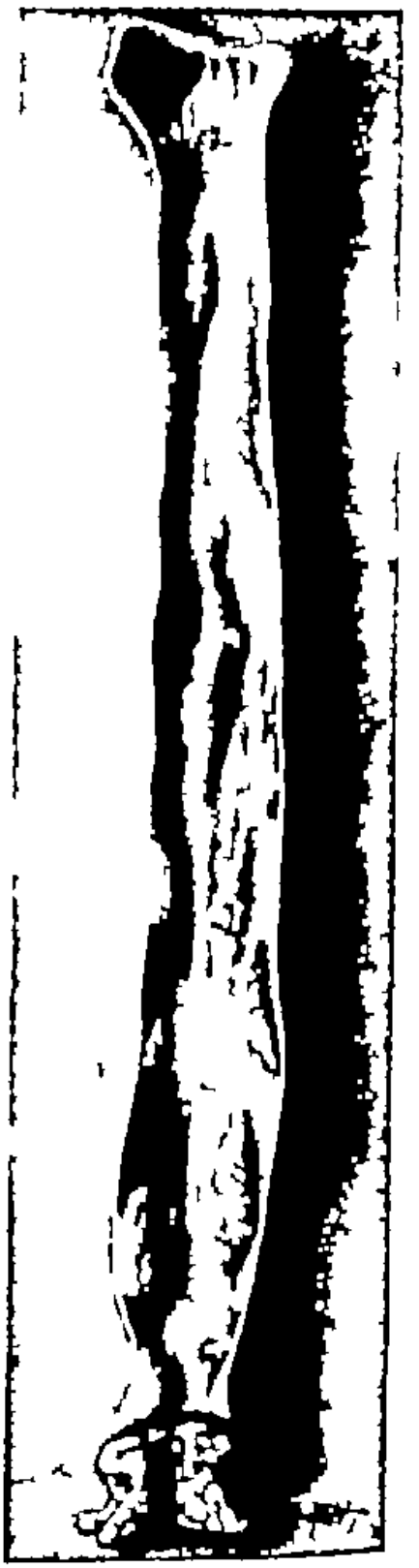


Fig. 4. Papillomatous growth in ureter and left ureteral orifice



Fig 5 A Fig 5 B Fig 5 B

Fig 5 A Section of growth from the kidney pelvis
Fig 5 B Section of growth from the ureter

Fig 5 B Section of growth from the bladder

pain occurred at interval of one to three days and as a rule was followed by hæmaturia lasting several days. After she was 40 the pains were less severe but continuous

There are also some general symptoms to be noted such a weakness, marked pallor loss of flesh anæmia, and loss of appetite Fenwick (7) has called attention to an important sign namely that when there is a growth in the pelvis of the kidney in which there is pelvic dilatation the ureteral orifice is altered in the nature of a dull-colored swelling and elongation of the opening of the ureteral orifice This was not noted in my case

It is very often hard to determine just where the growth is located but with the aid of the cystoscope and by ureteral catheterization and injection of collargol one may make a fairly accurate diagnosis A tumor at the ureteral orifice would lead one to suspect a growth higher up It is not unlikely that in the recurrent tumors of the bladder especially those situated in proximity with a ureteral orifice the real source of the trouble is a growth in the ureter or kidney pelvis and the recurrences are transplants Evidences of renal pelvis papilloma may be present for a long time even months or years in a benign form, and the general health may suffer only slightly

Sooner or later however it will show symptoms of malignancy Early removal of the kidney and I believe in most cases the ureter as well, is the only treatment.

Herewith are appended the cases of a similar condition Case 17 reported by Picot is of striking similarity

Case 1 Busse (8) case in a man, age 43 who had a sudden attack of hæmaturia and pain in the left renal region. In the following seven years they did not entirely disappear In his fiftieth year bladder hemorrhages brought him to the hospital Nephrectomy was performed by Prof Schuchardt The patient recovered, but died of exhaustion four and one half months after the operation The inner surface of the renal pelvis was covered with fine villi, which reached into the ureter There was a tumor in the bladder The edges were covered with numerous long villi At first these were benign but a few months before death became malignant

Case 2 Kohlhardt (9) case of a woman, 60 years old For two years she had noticed blood in the urine intermittently The left kidney was extirpated and a villous tumor was found partly reaching into the ureter The renal pelvis and calices were much enlarged In the upper half of the former close to the ureter end, was a tumor mass (the size of a small pigeon egg) which inclined toward the ureter Small villous tumor masses were located on the entire mucous membrane of the renal pelvis and calices to the upper third of the ureter Brickl stated there was multiple villous tumor formation originating in the left renal pelvis, renal calices and ureter the bases of which showed proliferation of the same As result of the villi the urine flow was hindered and a hydronephrosis resulted. The patient was cured. Hoyer (10) in his account of the case states that Kohlhardt divided

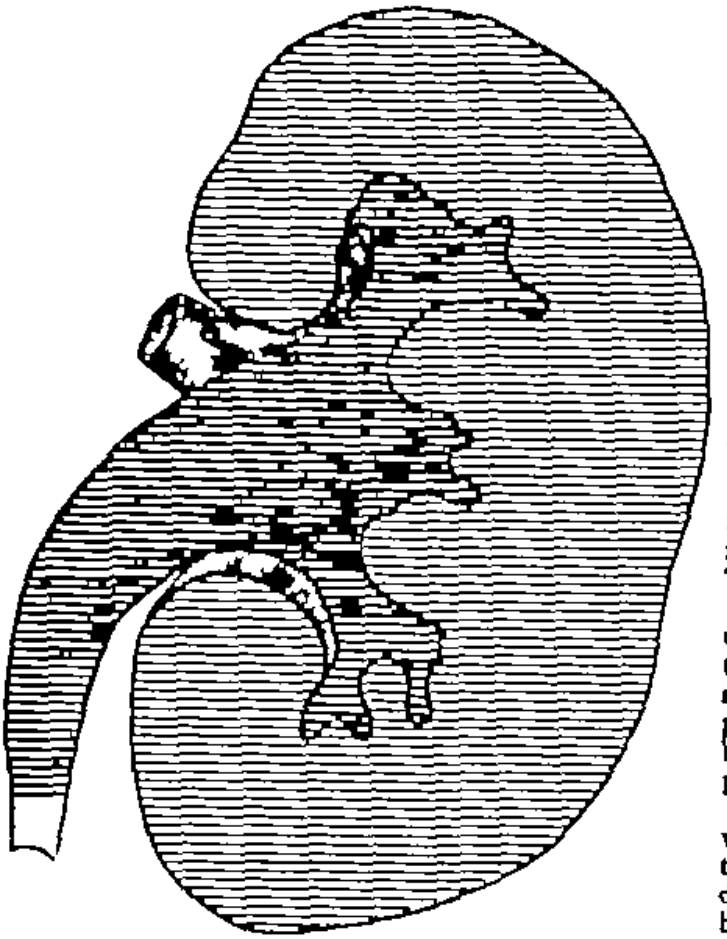


Fig. 6. Diagram showing growth in pelvis

carcinoma and inclined toward the diagnosis fibroma papillare diffusum and pyelitis villosa, and also that the patient died from pulmonary metastases one and one half years later.

Case 3. Pohl (3) case of man 44 years old. Three and one-half cm. of the ureter was removed, also the left kidney. The renal pelvis was enlarged to the size of man's fist. Small groups of gray hilt protuberances were seen in the renal pelvis. Briefly stated there was villous tumor of the mucous membrane of the ureter and the renal pelvis of the left kidney which did not penetrate deeply here, but did in the calices. It also had hemorrhages. The growths extended into and the bladder. The specimens were examined after the death of the patient. Pohl (3) says that years ago various names were used for these tumors, such as villous polyps, villous cancers, tumores villosi, fibroma papillare, papilloma without distinguishing between benign and malignant. To-day they go under the name of villous cancer or carcinoma papilloma. Due to reasons unknown to him, papillary growths existed on the mucous membrane of the renal pelvis and the ureter which showed plainly carcinomatous growths in the calices. It is not known positively whether they were benign or malignant at the start. It probably was carcinoma in the calix.

Case 4. Rayer's (3) case of a woman aged 51. She died of hemorrhage. The autopsy showed a collection of fluid in the abdominal cavity. In the greatly enlarged liver were numberless cancer nodes of all sizes. The mesenteric glands were infiltrated with cancer. The kidney itself showed nothing. On the mucous membrane of the renal pelvis could be seen small, pedicled tumors of gelatinous nature. Similar changes were also found in the ureter and bladder.

Case 5. Drew's (4) case of male, 56 years old, who was admitted to the hospital July 24, 1846, under the care of M. Barker. For three and one-half years at intervals he suffered pain resembling renal colic. Other symptoms were hematuria, at times quite profuse and a swelling in the abdomen which was probably due to a large tumor, evidently renal in the left side of the abdomen. On July 30th nephrotomy was performed but no stone was found. The patient died November 7th. The wound discharged much pus, containing flakes of lymph which, under the microscope were found to consist of renal epithelium and pus. The autopsy showed the right kidney slightly distended, the left much enlarged, the renal pelvis and calices greatly dilated, the lining membrane of the latter thickly covered with pinkish papillary growths, there were numerous spongy-looking nodules near the renal pelvis. The ureter was dilated and filled with pus. Along the length of the mucous membrane it was filled with tufts of delicate growths attached by narrow base. The bladder was small. A large red papillary growth was springing from the margin of the left ureteral orifice. It was cystic the size of pea. The base of the villous growth did not infiltrate the wall of the bladder. Morris (5) in mentioning the case said that the growth in the renal pelvis was epithelial with cells of transitional type and those in the ureter were simple papilloma.

Case 6. Moore's (6) case. A man, 34 years old, had suffered with kidney colic four years. For two and one half years he had painful hemorrhage. The kidney upon palpation was very painful and the urine contained many erythrocytes, leucocytes and also numerous large cells of varied shape. The renal pelvis and calices were much enlarged. Both the kidney and ureter were removed to the bladder. The microscopic examination showed typical papillomatous proliferation of the cylindrical epithelia of the renal pelvis and ureter. Several glandular formations caused Moore to diagnose the case as adenocarcinoma papilliferum. Further progress of the case is unknown.

Case 7. Matsuoka's (7) reports case of papilloma of the renal pelvis from the surgical clinic of Tokio. The diagnosis was pyonephrosis and nephrectomy was performed. A purulent cystic kidney with villous growths of the renal pelvis was found. The villi are transplanted to the ureter and microscopically are located upon connective tissue framework which is covered with thick layer of epithelial cells. The description of this picture is

ery interesting since it shows the transition from the benign to the malignant stage.

Case 8. Hedenius and Waldenstroem (8). The diagnosis showed bladder and kidney calculi. In the autopsy it was found that the renal pelvis was enlarged because the mucous membrane was covered with mass the size of a hazel nut. It was closely joined, uneven and composed of grayish-white, soft nodules. From the renal pelvis the neoplasma went to the ureter, the wall of which showed thickness of 5 cm. In the histological pictures the neoplasma showed fine, connective tissue stroma, rich in large epithelial cells of varied forms with large kernels and granular protoplasma. The bladder contained no stones.

Case 9. Derewenko (9) case of woman, 54 years old, who had noticed blood in the urine since the summer of 90. In March 905 she was taken to the clinic and operated on the 20th of hematonephrosis. The kidney was not removed. There was no trace of new growth. The patient developed pneumonia, then a suppuration and was dismissed June 20th. In September of the same year she was received again. The diagnosis based on the previous operation was unilateral hemorrhagic nephritis, and in October the left kidney was extirpated and the patient dismissed. In the hydronephrotic trophied kidney were benign cauliflower new-growths. Blood was again noticed in the urine nine months later and the patient received into the hospital. At the cystoscopic examination papillomatous formation was seen projecting from the ureteral orifice. It was radically extirpated by opening the bladder. Scarcely one-half year after her dismissal she complained of lumbago, paraplegia, retention of urine, paralysis of the bladder and rectum. Later gangrene set in and after few days the patient died. The autopsy showed a tumor in the left renal region which destroyed the second and third lumbar vertebræ and caused metastases in the liver and lungs. This new growth was called villous cancer and it was emphasized that it was different from the new growths found before in the ureter and renal pelvis. Derewenko is of the opinion that the benign papilloma of the renal pelvis caused metastases in the retroperitoneal lymph glands at the hilum and in the aorta, which remained latent. The ureter was entirely covered with proliferations and only after removal of the kidney and ureter did these malignant proliferations begin.

Case [illegible]. Savory and Nash (10) report a case by Barker of a man 56 years old who had villous carcinoma in the dilated calices and simple papillary tumors in the bladder and ureter.

Case [illegible]. Cattani (11) case is that of a man 63 years old with the following history. Immovable tumor of the abdomen, hematuria with symptoms of cystitis and pyelitis, pains in the lumbar region, slight albuminuria, in the urine sediment were cancerous elements, cachexia, exitus. The cancerous infiltration originated at the beginning of the ureter. It was of grayish color and partly ulcerated. The tumor which was transplanted to the renal pelvis and had advanced to the cortex of the kidney was found to be a medullary carcinoma.

Case 12. Bradford and [illegible] (12) case of a male, age 44 who was brought to the hospital October 1 89[illegible] with a severe attack of delirium tremens and severe hematuria. Six months ago he noticed blood in the urine for one week. A large tumor was found in the left hypochondrium extending down to the umbilicus. The patient died Oct. be 5th. The post mortem showed that the tumor felt during life was the left kidney. There was a calculus in the renal pelvis, the mucous membrane of which was thickly covered with papillary benign growths, which extended into the ureter one and one half inches. There was no epithelial ingrowth into the wall of the ureter and renal pelvis. A stone caused hydronephrosis.

Case 13. Busse (13) case, a man 60 years old. Prof. Hackel extirpated the kidney tumor under great difficulties. The operation was apparently successful but the patient died four weeks later. He had an abscess in the lung and also hemorrhage. The wall of the renal pelvis was covered with small, wart-like elevations on the mucous membrane with broad base or thin thread-like pedicle. similar ones were also present all over the mucous membrane of the ureter, thickest near its orifice into the bladder where a tumor the size of a hen's egg was found. There was a similar tumor in the bladder near the orifice of the right ureter and two smaller ones near the large tumor. That this was benign tumor is known from the histological formation of the tumor, also from the patient's history. The suffering could be traced to twenty years.

Case 14. Knowsley Thornton's (24) case of a woman 33 years old. She is said to have suffered with pain in the right renal region since she was eight years old. Nine years before admission to the hospital she had occasional attacks of hematuria. During the last few months a tumor in the right side of the abdomen had become very painful. She had cystic kidney. Nephrectomy was performed and the patient was up on the 3rd day. The specimen is unique. The ureter is surrounded at the exit from the kidney by a papillary growth the size of a pea. It is capped by an olive-shaped dark-brown calculus. The openings from the calices into the renal pelvis are dilated, they are blocked by these smaller brown calculi. The patient made good recovery. Stonier (25) in his report of the case classes it among the benign. He said that upon examination of the specimen it was found that there was a villous new growth which extended from the mucous membrane of the renal pelvis to the beginning of the ureter and in other parts of the renal pelvis. There was no histological description of the papilloma and nothing more is known of the case.

Case 15. Murchison (26) case in a man aged 65 years. The patient had frequent hemorrhage and pain. Other complications set in and the patient died. At the autopsy it was found that the

base and surrounding of both ureters, especially the right were studded with long, delicate, villous processes, not forming a distinct tumor The ureter and pelvis of both kidneys were enlarged The mucous lining of the ureter was free The case was diagnosed as villous disease of the bladder In the kidneys the same morbid processes had begun. Stöwer (17) classes this case among the benign and adds that at the autopsy it was found that both renal pelves were covered with long villous tumors and that in the lower part of both ureters kidney concretions were found

Case 16. Fenwick's (18) case of a man 70 years old whose right kidney was removed on account of papillary growths in the renal pelvis and calices He had suffered with hemorrhage almost constantly for two years. At the end of the next year a recurrence was noted in the right ureter and this was removed Watson and Cunningham (29) in their report of the case state that the patient died uræmic four years later and that toward the end there was carcinoma of the prostate and squamous cell cancer affecting the nephrectomy scar

Case 17. Picot (30) has recently reported a case of a man 53 years old who was brought to the hospital March 26 1901 Seven years ago he had two hemorrhages, the following years five or six attacks and lately they had become more frequent and lasted longer He also complained of continuous pain on the left side The diagnosis based on cystoscopic examination was three tumors of the renal pelvis with secondary transplantation in the bladder Nephro-ureterectomy was performed The ureter showed neoplastic infiltration and also two tumors having the same characteristics those in the renal pelvis All these papillary tumors macroscopically had the same aspect as the calcal tumors recognized by the cystoscope The patient stood the operation well and returned home May 7th

Case 18. Israel's (31) case Israel reports a case of a villous growth on the mucous membrane of the renal pelvis Near the entrance to the bladder new growth could be seen which covered the last 3 cm of the ureter The patient, a man 55 years old, had a severe hemorrhage four years ago Since then the attacks have been more frequent but less severe He did not complain of pain nor colic, but by palpation it was felt that the kidney was enlarged Retention of urine and the hemorrhages had caused hematonephrosis Nephro-ureterectomy was performed

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THE FUNCTION OF THE PERIOSTEUM IN BONE TRANSPLANTS BASED ON FOUR HUMAN TRANSPLANTATIONS WITHOUT PERIOSTEUM AND SOME ANIMAL EXPERIMENTS

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THOROUGHLY to appreciate some of the questions involved in the subject of bone transplantation it will be necessary to consider briefly the three different views of recognized authorities as to the manner of regeneration of a graft.

1. The universally accepted view in Germany is that of Axhausen who maintains that the bone in a graft always dies is absorbed and is reformed from the periosteum, which alone remains living in transplants.

2. The second view is that of Macewen of Glasgow who says that the bone in a graft is reproduced from the proliferation of osteoblasts, derived from the osteoblasts within the bone of the graft itself and its regeneration takes place independently of the periosteum whose only function is that of a limiting membrane which prevents the spread of the osteoblasts into the surrounding tissues.

3. The third view is that of Murphy who says that the graft is not osteogenetic but simply osteoconductive. Provided that it be in contact at one or both extremities with other living bone the graft acts simply as a scaffolding for the growth of the capillaries with their osteogenetic cells as they advance from the living contacting extremities into the graft. The periosteum takes no part in the actual reproduction of new bone. To analyze Dr. Murphy's transplantations a little further I may say that I have gone through all of his reported transplantations with the object of finding out just what was done with the periosteum in each procedure. In a number of cases this was *not stated*. In all such instances I have ascertained from him in writing exactly what was done with the periosteum. In not a single instance did he omit to transplant grafts with more or less of their covering periosteum. From a practical point of view I should judge that he does not know just what would have happened had he transplanted grafts without their periosteum so that his conclusions as to the function of the periosteum are only conjectural.

The same may be said of Albee's work along this line. He agrees with Macewen and Murphy that the periosteum is unimportant so far as the life of the graft is concerned yet notwithstanding this view he has never done a human transplantation without the periosteum although he has performed 160 transplantations in all. It would strike the unprejudiced critic that the theories and practice of these men do not quite agree. Macewen and Albee have argued that because they did not consistently obtain bone as a result of transplanting periosteum alone consequently the periosteum has little function when it is left attached to grafts. Early in my work along this line it struck me that the proper angle from which to view this question of the function of periosteum could be obtained only from transplanting grafts of various sizes with and without their periosteum since this is exactly what we do in our human transplantations. We do not transplant periosteum alone. The former is precisely what I have done and I think that I have definitely and conclusively proved as you will later see, that the periosteum has a very important function in maintaining the nutrition of the graft.

When I looked over the results in a general way of both my animal and human transplantations, at first sight many of them seemed contradictory. On further analysis, however it appeared as though all of these contradictions could be readily explained if we looked at it in this light. The life of a living graft whether transplanted in the human

Read in the Section on Surgery, American Medical Association, Minneapolis, June 1912. From the Surgical Research Laboratory of Columbia University.



Fig. 1.—Case 1. Rib grafted into defect in lower jaw.

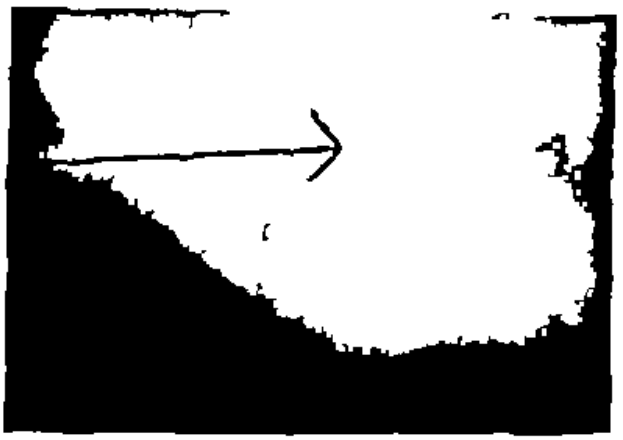


Fig. 2.—Case 2. Rib grafted into inguinal hernia without periosteum.

being or in animals, whether transplanted with or without its periosteum is probably entirely dependent on its being supplied with sufficient blood to keep it alive. I am inclined to believe that this will be the solution of the many vexed, theoretical considerations of bone grafting and will explain the apparent contradictions and varying results obtained in bone transplantations. To particularize further practically every bone graft made with its covering periosteum will live and grow if asepsis be attained. The question is, What will happen to grafts without their periosteum? The answer that I have obtained from my work along this line is this: The life of a graft without periosteum will depend entirely on its blood-supply. If it obtains sufficient blood, then it will live and grow; if not, then it will die. A small graft without periosteum will have a better chance of getting sufficient blood to its cells than a large one without its periosteum; but in either case there is always some doubt as to whether the graft will live if it be without its periosteum. *The periosteum on a graft* does one of two things, or possibly both, namely:

1. By its presence it so favorably influences the nutrition of the graft that it increases the blood-supply to its cells, as to keep it alive; or

2. In case the bone cells in the graft die from insufficient nourishment, the periosteum supplies living cells to the graft, by means of which the bone is regenerated.

I can see no possible reason why the living cells in a graft should die if they be provided with sufficient blood. I hold this to be the function of the periosteum when attached to a graft. I hope to justify the soundness of my position in the illustrations.

HUMAN TRANSPLANTATIONS.

Case 1.—In November, 1900, I removed half the lower jaw from a lad of 16 for a large giant-cell sarcoma. Fifteen months later I grafted into the defect in the lower jaw a piece of rib which was entirely stripped of its periosteum. One end of the rib was beveled and then sutured to the freshened edge of the remaining half of the jaw. The wound healed by primary union. Fig. 1 shows the rib in position. Five months later a roentgenogram showed an entire disappearance of the grafted rib. There never was any discharge from the scar.

The result in this case is a contradiction of Dr. Murphy's second conclusion, that bone, with or without the periosteum, transplanted in the same individual and contacted at one or both ends with other living osteogenetic bone always becomes united to the living fragment, and acts as a scaffolding for the reproduction of new bone."

Had I split the rib longitudinally so as to afford a better blood-supply to the bone-cells of the graft, it seems to me that it might have lived, or had I transplanted the rib with periosteum covering half its surface.



Fig 3 K, Case 3 Fig 3 P Case 3

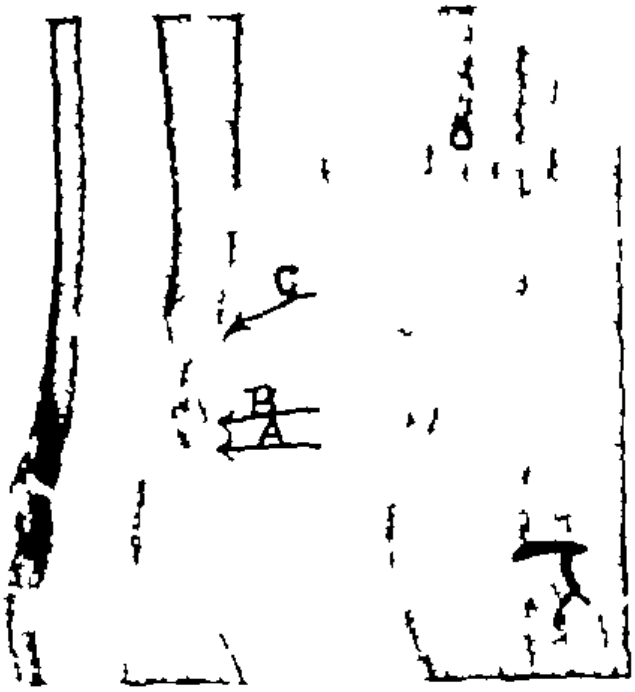


Fig 4 B, Case 4 Fig 4 E, Case 4

A, section for microscopic examination taken from tibia B section for microscopic examination taken from graft; C, graft

Case The patient was man, aged 3 into bone inguinal canal I transplanted a piece of a rib t strengthen hernial repair F g shows the rib in position \ roentgenogram four months later showed that the rib has entirely disappeared

This case is corroborative of Dr Murphy s conclusion that bone transplanted into muscle always dies and is ultimately absorbed. That this statement is not always true however will be seen later from some animal experiments. Had I split this rib likewise I believe that the consequent better blood supply to its cells would have kept it alive.

Case 3 The patient was man, aged 3 who had received compound fracture of the left humerus, a month before he came under my care. H was operated on immediately after the accident in another institution and the fracture was wired This was followed by violent sepsis T o sequestra were packed out of the wound the next day after the man came under my care. The patient had a musculospiral paralysis, indicated by the wrist-drop The result of the application of a Lane plat t the fracture, after sawing off the ends of the fragments was still non-union

Fi months after the previous plating, on ac count of non union, I grafted int the medullary ca ities of the fragments, which were first reamed out, section from a subperiosteally resected rib \fter the rib as in position there as some side to-side rocking of the fragments on each ther due to the fact that the rib was evidently trifle too short. On this account I applied a Lane plate It was then thought best t nit the divided musculospiral nerve The ends were dissected out and t was found that there was a defect of a inch and half t be bridged over This as accomplished by cutting out of the distal extremity segment, which was turned up t meet the proximal end, to whose freshened edge it was sut red w th chromic gut. Th result of this bone grafting was very disappointing A picture (Fig 3 K) after nine months showed no proliferatio whatsoever of its bone and there was no better union than at the time of the grafting

That the musculospiral nerve was regenerating as shown by the fact that sensation had ret rned in the distribution of th nerve, although there was no motor power as yet. Nine months after the rib grafting I removed (Fig 3 K) the remains of the grafted rib A sectio of it under the microscope showed that it was undergoing rarefying osteitis and that it consisted mostly of dense fibrous tissue rth scattered areas of bone The medullary cavities of the fragments were reamed out (Fig 3 P) and into them was inserted a graft, taken from the front of the tibia with periosteum on t of its sides A nail was inserted in its upper end to prevent its riding up into the medullary cavity

The result of this grafti g was unf rtunate. There was infection of th wound, requiring th removal of the nail and the dead graft. So that his condition was not improved

Case 4. This is an exceedingly interesting case of non-union in birth fracture of both bones of the

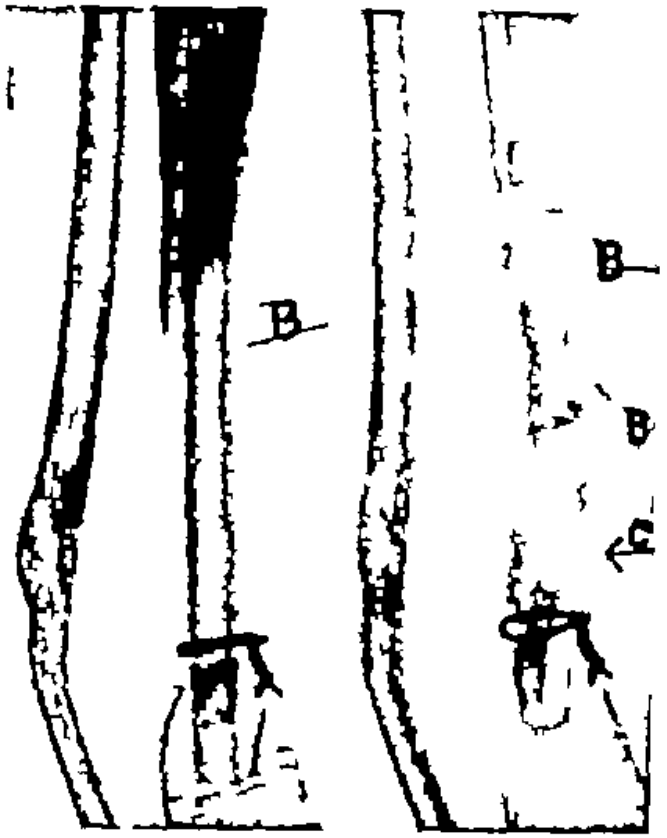


Fig 4 I Case 4 B new bone in thin plate along periosteum Taken ten months after operation, shows beginning new bone being formed

Fig 4 K Case 4 B new bone from periosteum C, fracture

leg in child, aged 7 months The non-union I attributed to insufficient immobilization of the leg I cut down on the fracture and, after freshening the pointed extremities of the fragments there resulted defect of a inch and half in the tibia which made transplantation of bone necessary A graft from the opposite tibia as chiseled out with its periosteum attached The periosteum was then deliberately peeled off the graft with the object of confirming Mikulicz's view of its unimportance One end of the graft as pointed and it as edged into the medullary cavity of the upper fragment and the lower side of the transplant as spliced to the side of the lower fragment with chromic gut The subsequent union of the wound as by first intention Fig 4 B shows the condition six months after the grafting It as very disappointing to see the tibial graft gradually melting away in the tissues so that after six months, it was not more than one quarter its original size Since union was by first intention, there seems no way of accounting for the death of the graft as on the basis of lack of periosteum, or of deficient blood supply or both Fig 4 E shows the condition six months after the previous grafting operation At which time I transplanted 5 inches of the opposite, healthy fibula into the medullary cavities of the fragments, as seen. It was transplanted with the periosteum covering its entire circumference and this was not split in the slightest. The result shows that this splitting of the periosteum on the graft is entirely unnecessary and accomplishes nothing Below wire-encircling suture as used to hold the graft in place. On the right one sees the defect made in the fibula Fig 4 I shows new bone being formed along the periosteum of the fibula graft, as a thin plate two months after grafting

Fig 4 K as taken six months after the transplantation To my mind it seems to imply the necessity of revising Dr Murphy's conclusion that a graft is not osteogenetic in itself. A fracture has taken place in the mid third of the transplant, due to the fact that the child kicked off the splint one night. We see that this fracture of the graft itself is consolidating nicely under an enormous callus If I accept Dr Murphy's conclusion, we must believe that all this callus came through the graft from the contacting old bone of the neighboring stumps

I do not accept this view for a moment but believe that the callus arose either from the periosteum or from the bone of the graft itself Along the outer surface of the graft there is at least a quarter of an inch of new bone evenly distributed Were this new bone formed from the contacting ends of the old bone of the stumps, it seems to me that it would shade off becoming less the further we went from the old bone As a matter of fact the greatest amount of new bone is at the fracture spot in the graft, which is at some distance from either contacting extremity of old bone. Fig 4 K shows that the transplant (June 9, seven months after the grafting) has continued to develop The upper part of the graft has become as large as the opposite healthy tibia The fragments below the fracture, due to the inhibitory influence of the wire, have not well developed I addition the wire is eroding the bone of the graft. I removed this wire June 4 9 3 with the object of preventing the cutting through of the graft

Fig 4 M shows that, six months after the transplantation, there is no filling in of the defect in the fibula with new bone since all the periosteum was removed with the graft. To have new bone fill up a defect it is absolutely necessary to leave either some bone or else some periosteum in place bridging the defect

Fig 4 P shows the result ten months after the removal of the wire The lower fragment which was being eroded by the wire has markedly developed and the fracture is consolidating nicely

At the recent surgical congress in New York, Dr Murphy and I both transplantations there is but one absolute essential, other than rigid asepsis, and that is that the bone graft must be closely connected at some one point with living, freshened, osteogenetic tissue From the preceding human transplantations, I judge that there is one other essential and that is the presence of the periosteum

ANIMAL EXPERIMENTS

Experiment Fig 6 shows the condition six months after the resection of the whole diameter of rib together with its periosteum The defect has not t all closed in The periosteum was stripped bluntly from the bone section and this strip of periosteum was transplanted into the abdomen

Result A transverse section was cut six months later through this periosteum, which was felt to be bone. A photomicrograph of this section gives picture of normal, healthy living bone surrounded by a closely investing connective-tissu capsule There are no osteoclasts present nor any round cells suggesti of either a destructive or an inflammatory process I shall not go int description of these microscopic sections but shall give you simply the results of them This result shows that transplanted periosteum may produce li ing bone.

Experiment 3. This animal was killed eight months after the subperiosteal resection of a section f rib (Fig 7 A) This rib without periosteum w then split into longitudinal strips and these w re transplanted int the abdomen

Result The defect in the rib from which the periosteum was not removed has become entirely filled in with new bone (Fig 7 A) The strips transplanted into the abdomen ha e remained intact have grow together and ha e increased in size A photomicrograph of section of this abdominal transplanted bone shows bon perfectly alive, not undergoing bsorption, and co taining well-pre served and normal marrow I ttribut the living of these transplants to the fact that the splitting f the original rib allowed sufficient blood to get to the bone cells

This and the following experiment are ref utations of Dr Murphy's conclusion in which he says that bone with or without its periosteum, when transplanted into the soft parts and not in contact with living bone always becomes absorbed

Experiment 4 This dog was killed si months after subperiosteal resection of tw ribs The ribs ithout periosteum ere broken up with the rongeur int the smallest possible fragments and these were transplanted into the abdomen

Result The defects made in the two ribs have cted differently one from the other (Fig 8 A) The upper defect has about half filled in with new bone while the lower has formed complete new rib almost double its normal size The fragments (Fig 8 B) into the abdomen have lived have increased in size, and hav amalgamated int one homogeneous piece \ photomicrograph of sec tion, taken from these bdominal grafts, shows that the graft is perfectly alive, and contains normal marrow and normal blood essels There are no osteoclasts present nor ny signs of destructive or degenerat process



Fig 4 M. Case 4 Fig 4 P Case 4

The last two experiments clearly demon strate that the life of a living graft depends entirely on its receiving sufficient blood to keep it alive and nothing else This was made possible by the splitting of the grafts which allowed sufficient blood to get to their cells The next two pictures more clearly bring this point out, both being the same experiment

Experiment 5 In this animal, killed fter one mo th, t ribs ere subperiosteally resected One of the ribs was transplanted int the bdomen, int defect mad in the last rib, after the periosteum of the last rib as divided and separated but not removed The second rib also thout its periosteum was sutured t the end of the first rib and both ribs in contact were buried in the abdomen

Result Th first rib (Fig 9 A) has healed in perfectly to the defect made in the last rib by a massive callus formed t the point of junction evidently due to periosteal bony growth There is no union or new bone formed whatsoever between the t transplanted ribs, owing, as I believe, t an



Fig 6. Experiment A, resected rib B periosteum with new formation of bone after 2 months three cells transplanted into the abdomen C, transverse section for macroscopical examination



Fig. 7 A Experiment 3 Middle of left rectus, sheath divided and strips laid on muscle separated from each other sheath sutured over these Picture shows rib entirely reformed and growth together of bones in abdomen

insufficient blood supply t their cells and t the absence of periosteum t re form the bone I addition the second rib shows beginning absorption evidenced by it honeycombed appearance. Th picture indicates that an entire graft an entire graft, neither having any periosteum will not live.

Experiment 6. This is the same experiment as the preceding The animal was killed six months after four ribs were resected without their periosteum One of the ribs without periosteum was sutured t defect the last rib second rib was sutured t the end of the first, and both ribs were buried in the abdomen Fragments from another rib which was divided int as small pieces as possible were strewn along both the transplanted ribs

Result Fig shows that all the four defects created in the ribs have become completely filled in with new bone, owing undoubtedly t the presence of the periosteum, which had not been removed The picture further shows that the second ttached rib, as well as about half the first rib has become entirely absorbed. Some of the fragments has become attached t the sides of the remaining part of the first rib

The last four experiments are a convincing demonstration it seems to me of the fact that it is simply and solely a question of a sufficient blood-supply which determines whether a graft will live or die and not a question of whether the graft be in contact with living bone or not as Dr Murphy maintains

Experiment 9 This animal was killed five months after re moval of the radius, together with its periosteum was removed The periosteum was then scraped off the fragment both as split into as small pieces as possible with the rongeur These small fragments were replaced, filling in the defect In the radius

Result The small fragments (Fig 3) have all remained all and has coalesced into one piece which has become united t the ends of the radius fragments.

This experiment illustrates the influence of a good blood-supply on grafts.

Experiment 1 This dog was killed t enty four days after the periosteum was excised from wide area of the humerus Within this area as elsewhere very section of bone extending into the medullary cavity and the marrow and endosteum were thoroughly curetted a y

Result Fig 6 shows that the cavity made in the bone is irregularly filled in by new bone, the medullary cavity being quite obliterated by the newly formed bone The periosteum can be seen ending at quite distance from this cavity and by no stretch of the imagination can one think that it had anything t do with the formation of new bone Likewise with the endosteum The new bone must then come from the bone-cortex itself, resulting from the efficient blood-supply from the nutrient rtery From these cases and experiments, we see that to have new bone fill in defect it is necessary t have either some periosteum covering it or else t least a thin layer of bone bridging over the defect.

Experiment 3 The last statement made is exemplified in this animal, both as killed six months after the removal of an inch and half from the radius, together with its periosteum The animal was killed because he fractured the ulna, immediately opposite the defect in the radius

Result Fig 7 shows that there has not been the slightest attempt t fill in the defect in the radius with new bone, owing as I believe, t there being no periosteum left to produce it If Macewen and Murphy were right in their views, by as this defect not filled th bone coming from the ends of the fragment

Experiment 4 This animal was killed three months after the removal of t inches of bone from two ribs, each with its corresponding periosteum Each single fragment was transplanted into the defect made by the removal of the other fragment, each being completely covered by its periosteum They were both held in place, end t end, by sutures



Fig 8 A

Fig 8 B.

Fig 8 A, Experiment 4 T ribs subperiosteally resected. Shows perfect reformation of one rib and imperfect reformation of other

Fig 8 B A, section for microscopical examination B new bone

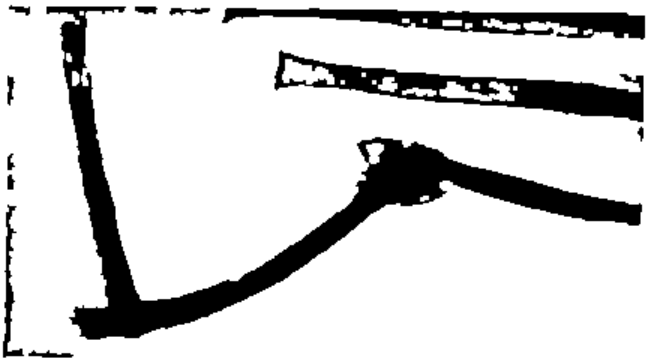


Fig 9 A, Experiment 5 The t transplants are shown, the upright or second transverse rib shows beginning absorption and also the bridging of union between it and the adjacent transplant The first transplanted rib shows an excessive callus and solid union due t periosteum

passed through drill-holes in their extremities and through drill-holes in the ends f the fixed ribs

Result One end (Fig 18) of each graft has not united t its corresponding extremity of the rib owing t the respiratory motions The other ends are solidly united to the fixed rib In addition there is irregular production of new bone at various points on the grafts, due to periosteal growths This result shows the great influence the periosteum exerts in preserving the life of grafts. Microscopic sections of each of these transplants show that they are both actively alive

Experiment 5 The animal died six weeks after ½ inches were resected from each fibula with the periosteum attached Into the right fibula defect was transplanted the left fibula graft without any of its periosteum, the transplant being first divided into six fragments Into the left fibula defect was transplanted the right fibula graft, which was previously divided into six fragments, on each of which was left its corresponding periosteum

Result The fragments without periosteum (Fig 9) in the right fibula defect have become almost entirely absorbed. There is just a faint line indicating the little that remains of the grafts. In striking contrast to this is the result in the left leg into which defect the fragments were transplanted with the periosteum on each fragment These individual grafts have not been absorbed in the slightest on the contrary they have grown together and have increased in size It is not possible to escape the conclusion that this good result in the left leg is entirely and absolutely due to the presence of the periosteum If the result depended simply on the contact with the neighboring, living bone of the stumps, as Murphy maintains, why did not the fragments without periosteum in the right leg live

Experiment 6 Fig 10 shows the condition eight months after sections were taken from each fibula, from each of which the periosteum was carefully scraped Into the left fibula defect was transplanted the entire undivided right fibula fragment without periosteum in contact with the ends of the living stumps Into the right fibula defect was transplanted the left fibula fragment without periosteum which was first divided into two longitudinal strips, these being placed side by side in contact with the ends of the living stumps

Result The two fragments without periosteum (Fig 10) comprising the graft into the right fibula defect, have lived perfectly and have united together and to the ends of the old stumps In addition there is proliferation of new bone, uniting the graft to the neighboring tibia. In contrast to this is the result in the left defect This graft without periosteum, transplanted entire has very poorly united to the ends of the old stumps, and the transplant appears, from its poor shadow and irregular honeycombed appearance to be absorbing I attribute this difference in the result to the fact that the splitting of the graft allowed much better blood-supply to reach the bone-cells of this graft than was possible in the case of the graft which was not split.

Experiment 7 Fig 11 is very instructive and illuminating, and warrants close study It was taken eight months after sections of bone were taken with the periosteum from each fibula Into the left fibula defect as transplanted the right fibula graft which was first broken up into the smallest possible pieces, the periosteum being thoroughly scraped from the small fragments The pieces completely filled in the defect and were in contact with the ends of the stumps of the old bone. *Into the right* fibula defect were transplanted fragments of the left fibula graft with periosteum still attached to each small graft

Result Fig 11 indicates the great value of having periosteum on grafts The small fragments without periosteum in the left defect have become largely absorbed being much reduced in number Those which remain are isolated are not united, and appear to be absorbing. In marked contrast to these are the fragments transplanted into the right defect with periosteum. They have become united to each other in most instances, have increased in size and produce the deep shadows of healthy living bone.

This experiment is another instance of the fact that contact with living bone does not

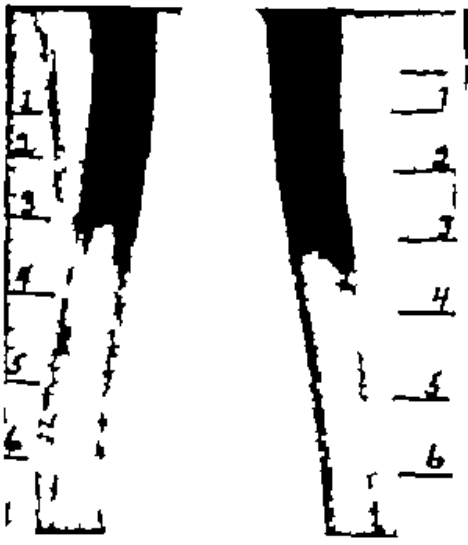


Fig 9, Experiment 5 Points of section



Fig 10, Experiment 6



Fig Experiment 7

This is brought out by Frangenheim and von Hacker They each took pieces from the fibula, comprising the whole thickness of the bone together with all the periosteum covering these fragments There w no subsequent reformation of bone in the defects. Frangenheim consequently recommend that in taking a section from the fibula, small strip of periosteum from hich the fibula will be reformed be left on the interosseous membrane

4 Provided a graft be living and taken from the same patient its future life depend on an efficient blood-supply irrespective of the periosteum or whether it is in contact with living bone or not This conclusion I wish to emphasize strongly

Proof Animal Experiments 3, 4 5, 6 nd 18

5 If minute fragments of a living graft be transplanted then the periosteum may be disregarded because the osteoblasts in the fragment may not die because of an easy access of blood into them and the pieces may grow and coalesce and not become absorbed My tatistics show that 50 per cent of such trans plantations will be successful

Proof Animal Experiments 7 9 6 and 8 also Macewen human case Thus, his book he narrates the case of boy the whole of the diaphysis of whose humerus he was compelled to remove for necrosis There no subsequent osseous deposition I ift en months later t wedges of bone were e cised from another patie t 6 years of age affected with antero curves These were cut int min t fragments, quite irrespectiv of the periosteum, and were then deposited in the muscul sulcus l the boy's rm. Two months later portion of new bone an inch in length and thr quarters f inch l thickness, was found firmly ttached t the upper fragment f the humerus. Here all the grafts proliferated, grew to one another and also t the extremity of the prox imal portion T other wedges f bone of larger size than the first and broken up int fragments ere simul rly dealt with and inserted t months subsequently to the first graft, and third couple were placed in position five months fter the first. These all fused together nd t the condyles of the humerus and filled the gap in the arm t the extent of 4 inches. It is now th rty years since the shaft of the humerus as rebuilt, and during that period the ma has depended on his physical exertions for his li elihood H is now an engineer' pattern-maker Other cases in which minut fragments of bone h e been successfully transplanted are on record Thus Vallas[1] reported the case of oman on hom he had operated fiv months previously for pseudo arthrosis of the tibi At the operation, he found that the end of the fragments touched t onl small point due t the slender form of the inferior fragment H then removed from the rounded extremity of the pper segment ten or t l bony chips hich he placed in the defect bet een the bones The periosteum and soft part re then sut ed about these bits Pri-mary union resulted nd t six eks consolidation was complet and the patient left the hospital Barth reports t successful cases h each f hich he tra splanted t fragments, taken from the tibia each covered by periosteum I both of these cases, the fragments grew and proliferated and filled in the defects perfectly E en though one is safer in transplanting small fragments with-out the periosteum than larger ones (compare Ex periment Nos 6 and 8) t the same time the

[1] Fragmbrun Arch f klin Chir 1899 xc 438
Von Hacker Quoted by Bruns Beit klin Chir xxvi Heft, Part

Allen Lyon mid 1891 Ixxv 600
Barth Arch f klin Chir 1908 lxxxvi 860

small fragment may die if they are without the periosteum (compare Experiments Nos 15 17 19 and 20)

6 If a larger piece of living bone be transplanted then it is safer to leave the periosteum attached to the graft to assure its future reformation since otherwise the osteoblasts in the bone of the graft may die because cut off from their nutrient artery The periosteum survives because of its sufficient blood-supply from the surrounding tissues Its inner surface forms osteoblasts which themselves proceed to reform the bone of the graft, In the event that the osteoblasts within this have died from a deficient blood-supply My statistics show that 41 per cent of transplantations are successful in which large grafts without periosteum are grafted

Proof Previous Cases (human) 1 2 3 and 4 Animal Experiment 14 For the sake of being explicit I wish to state that this conclusion does not imply that the periosteum is unconditionally necessary for the growth of transplanted bone It merely asserts that one is much surer of the grafts living if the periosteum is present on the graft There are comparatively few cases on record of grafts having been made without the periosteum I presume that this is due to the fact that it is not customary to report non successes I have come across the following two cases which were successful after transplanting grafts without the periosteum Haskins recently reported a case which illustrates two things first how well the defect in bone may be made by removing its entire diameter all will in provided the periosteum be left and second how a graft may live and grow at times even when transplanted without its periosteum Thus he removed a segment without its periosteum from the diaphysis of a tibia for the purpose of transplantation Four years afterward the piece removed was found although new tibial tissue had formed The piece from the tibia transplanted to a defect made in the ulna for the removal of suppurating sarcoma which not only the bone but also the periosteum entirely removed The graft without periosteum transplanted into a defect bounded by periosteum grew perfectly and consolidated with the upper fragment of the ulna Dr Abbe reported a case in which he grafted both the radius and ulna without periosteum A segment about three and one-third inches long from the opposite limb to that of the defect had the resulting bone (osteum) lacking The graft was taken without its periosteum A roentgenogram taken after six months showed that the graft had lived and had increased in size

7 A graft on a graft neither having a covering periosteum will not live even though one graft be in contact with living bone

Proofs Animal Experiments 5 and 6

8 Periosteum when transplanted alone into the soft parts may produce living bone

Proof Animal Experiment The remarkable vitality of transplanted periosteum has been demonstrated by Grobe[3] and Morpurgo the former showing that it is capable of preservation for one hundred hours and yet able to be implanted and preserve its osteogenetic powers the latter showing that the periosteum of a corpse kept at 15 C can produce new bone when transplanted after 168 hours.

9. The splitting of the periosteum of a graft, even though the transplant is entirely surrounded on all sides by periosteum seems to be unnecessary and accomplishes nothing

Proof Previous Case 4 (human) in which the fibula graft was transplanted with periosteum on all its sides and this was split The graft grew beautifully

10 Altogether sixteen transplantations with periosteum were performed and of these all but one (93 per cent) were successful

11 Altogether twenty five transplantations without periosteum were performed Of these 48 per cent were successful (all in animals) while 52 per cent were unsuccessful The influence of the blood supply is demonstrated by the fact that 50 per cent of the transplantation without periosteum made with minute fragments were successful while 41 per cent of those without periosteum made with large single fragments were successful

12 From a consideration of all the foregoing facts the conclusion seems irresistible that bone grafts of whatever size In order that one should be positively assured of their subsequent living should be transplanted with as much periosteum covering their surfaces as possible

I desire to thank Dr Joseph Black for the privileges of the laboratory Dr William C Clark for the pathologic examinations and Mr Ira Simms of the Presbyterian Hospital, for the excellent roentgenogram

Bookwalter Does Bone Transplantation Occur
Barker The Growth the Dead and the Regeneration of Bone
Morpurgo

THE SURGICAL TREATMENT OF INTRAMEDULLARY AFFECTIONS OF THE SPINAL CORD

By CHARLES A ELSBERG M D New York City

WITH the increase in our knowledge of diseases of the spinal cord and its membranes and the advance in our surgical methods, operations for affections of the cord have become increasingly frequent. Up to within the last few years however surgical interference in disease of the substance of the spinal cord was rarely if ever attempted. Seldom had anyone ventured to invade the delicate tissues of the cord for fear of causing greater damage than that produced by the disease Excepting in rare instances such as Abbe s (1) attempt to empty a hydromelia cavity by aspiration, intramedullary cord affections were considered hopeless. If the diagnosis of intramedullary disease was made operative interference was considered contra indicated if an affection of the cord itself was found at operation the wound was closed without delay

It was perhaps fortunate for the progress of spinal surgery that the differential diagnoses between intramedullary and extramedullary disease was often uncertain that such signs as absence of pain and the dissociation of sensations were not always sufficient to permit a definite conclusion Hence intramedullary affections were encountered in the course of spinal operations and the surgeon gained a better knowledge of the physical character of intramedullary spinal disease Then followed isolated instances in which the surgeon ventured to in ade the cord substance—Krause (2) Röpke (3) von Eiselsberg (4) Veraguth and Brun (5) Braun (6) Schultze (7) Elsberg and Beer (8) etc. These surgeons were cognizant of the dangers of manipulation of the cord of the irreparable damage that might result from the slightest trauma and the danger of transverse lesions from injury to the cord tissue that in spite of this they ventured upon this unexplored field is another evidence of the restless forward march of scientific surgery

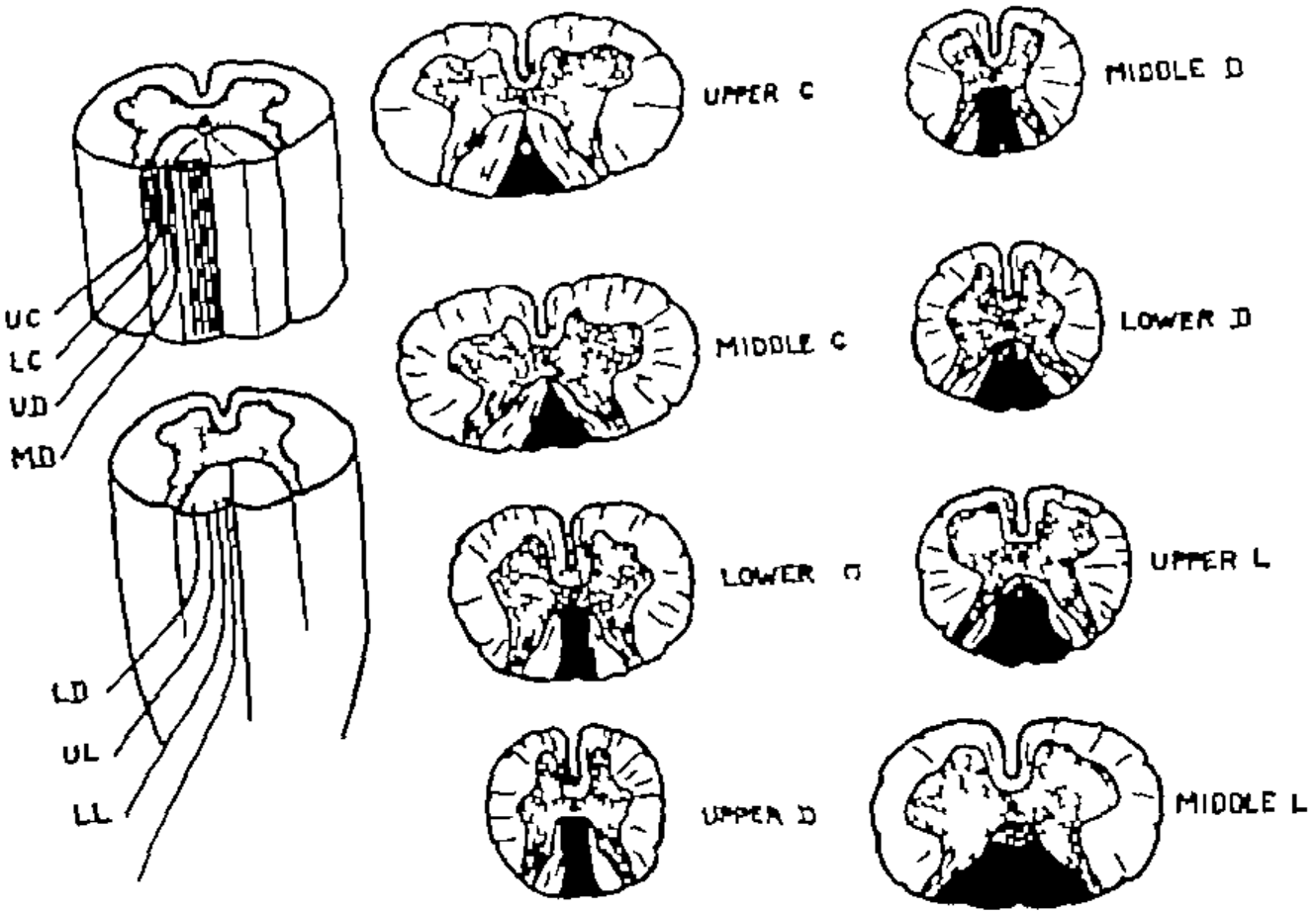
All these efforts to attempt the surgical relief of affections within the substance of the cord were, however only isolated efforts they were not based upon regular well worked out methods of procedure they lacked a carefully worked out anatomical foundation and the necessary special technique

During the past three years I have made a study of the anatomy and physiology of the spinal cord from the viewpoint of intramedullary surgery have attempted to develop a special technique and have applied this technique to the operative treatment of some intramedullary diseases. The results of these investigations and experiences are herewith described

THE FREQUENCY OF INTRAMEDULLARY SPINAL DISEASES WHICH MIGHT BE SUBJECTED TO SURGICAL TREATMENT

Intramedullary tumors are not by any means as rare as they are believed to be by some authors. Thus Allen Starr (9) quoting from Schlesinger states that among 302 tumors of the cord 125 were within the cord substance. These included sarcoma tuberculous tumors gumma, glioma lipoma, cysticercus, neuroma, cholesteatoma, myxoma, teratoma, adenoma endothelioma, etc Many of these intramedullary growths infiltrate the cord substance and increase in size by extending upward and downward but some enlarge in their transverse diameter are encapsulated and of small size Gowers (10) says that these tumors in some cases blend with the substance of the cord but in other instances they are bounded by an area of softening which often isolates even invading growths According to Flatau and Gowers many tumors are sharply limited Flatau (11) states that the comparati e frequency of extramedullary and intramedullary tumor is as 2 6 to (57 intramedullary tumors in 213 cases) Although one cannot estimate from the reports the frequency of localized and

Read before the Section on Neurological Surgery of the XVIIth International Congress of Medicine London 1913



Fig

Fig

Fig The conducting paths in the posterior columns of the spinal cord, showing that the fibers from the sacral (S) and the lower lumbar (LL) posterior roots lie nearest the posterior median fissure (diagrammatic)

Fig The areas in the posterior columns in which ascending degeneration occurs after injury to the sacral and lower lumbar posterior roots of both sides (after Schultze) Within these areas, shaded in black, an incision can be made which will cause little injury and few if any symptoms

encapsulated intramedullary growths the fact that one frequently finds illustrations and descriptions of such tumors in the literature is evidence for the contention that they are not so very rare Localized tumors have been found at operation by Krause Ropke Elsberg and Beer and many others Localized cysts have been found by Krause and myself That localized collections of fluid occur in syringomyelia and haematomyelia quite often is well known Foreign bodies have been found lodged in the cord substance. In the instances cited the affection of the cord is of such a nature that, physically at least its removal or eradication should be possible

Aside from these more strictly localized affections there are others of a more diffuse nature in which surgical interference might be of benefit. Thus the drainage of a haematomyelia or hydromyelia into the subdural space if it were possible of accomplishment with safety should at least remove the harmful effects of the pressure of the fluid upon the nerve fibers in the cord If an internal decompression of the cord were possible the harmful effects of slow growing and infiltrating tumors should be decreased by an incision into the cord as should also be the oedema which follows trauma or contusion of the spinal cord after injury to the spine (Allen) A decompressive incision into the cord might also do some good in spinal gliosis

Isolated cases are to be found in the literature of the subject in which intramedullary tumors were removed with great improvement

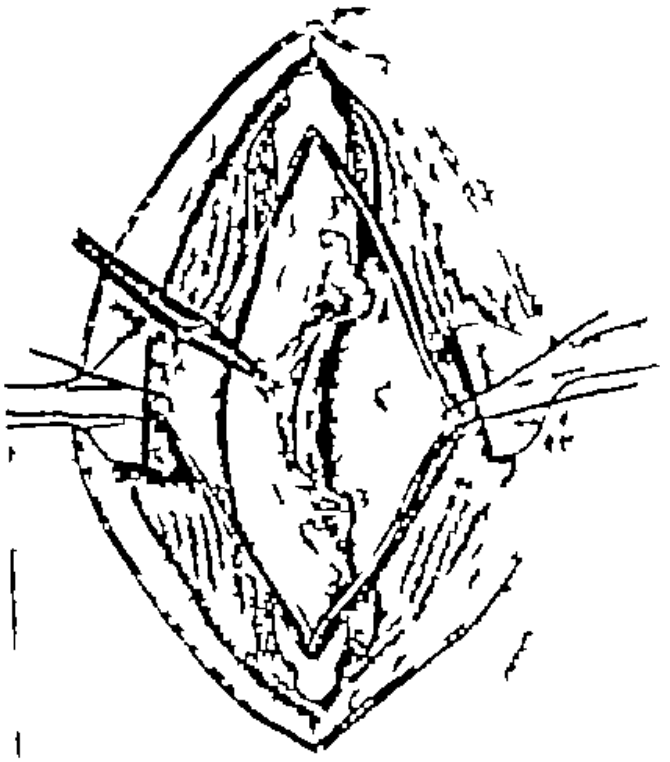


Fig 3 The method for the exposure of the anterior surface of the cord The cord is rotated by means of traction on divided slip of the dentate ligament

in the patient s symptoms—Ropke (3) von Eiselsberg (4) Schultze (7) Elsberg and

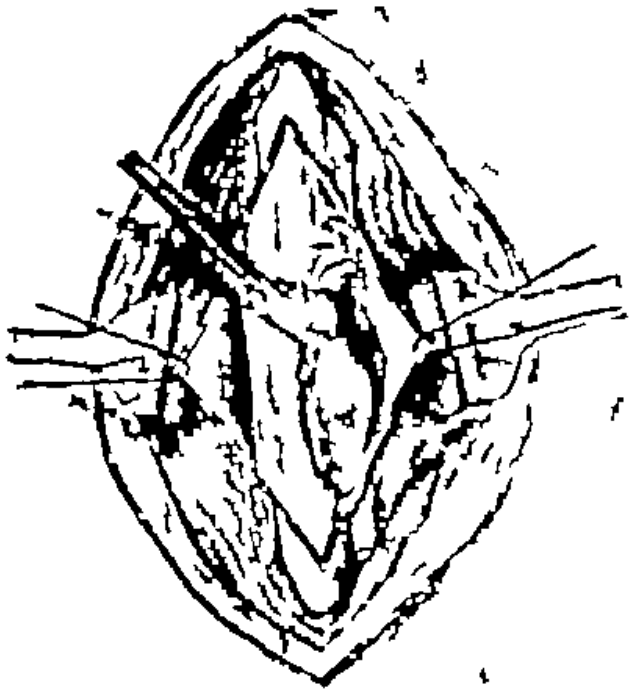


Fig 4 The appearance of subpial spinal tumor Tumors in this location have sometimes been mistaken for true intramedullary neoplasms

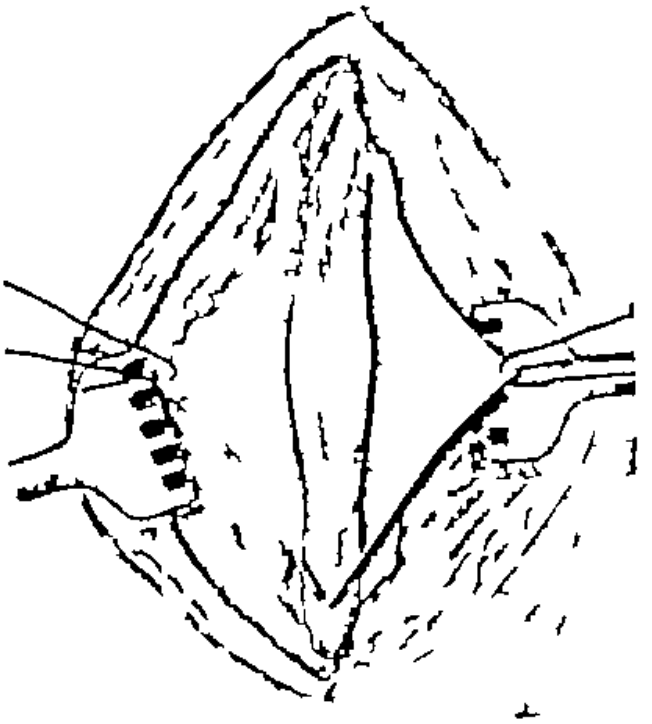


Fig 5 Appearance of cord after incision of hydromyelia cavity The openings of the central canal can be plainly seen

Beer (8) Intramedullary cysts and foci of softening have been drained—Krause (2) Elsberg (8) a small, well encapsulated tubercular focus has been removed—Veraguth and Brun (5) the attempt has been made (Abbe Krause Elsberg) to drain a syringomyelitic collection of fluid into the subdural space. The cord has been incised in order to remove a bullet from its substance—Braun (6)—and for the purpose of decompression in extensive irremovable tumors (Cushing, Krause Elsberg)

THE SURGICAL ANATOMY OF THE SPINAL CORD FROM THE STANDPOINT OF INTRA MEDULLARY SURGERY

Not only from their anatomical position and their physiological character but also from the ease with which they may be exposed, the posterior columns of the spinal cord are the most favorable for an incision. The fibers in the posterior columns convey principally tactile and deep muscle sensations to higher levels, although the fibers for all varieties of sensation enter the cord in the posterior spinal roots. Our knowledge of the

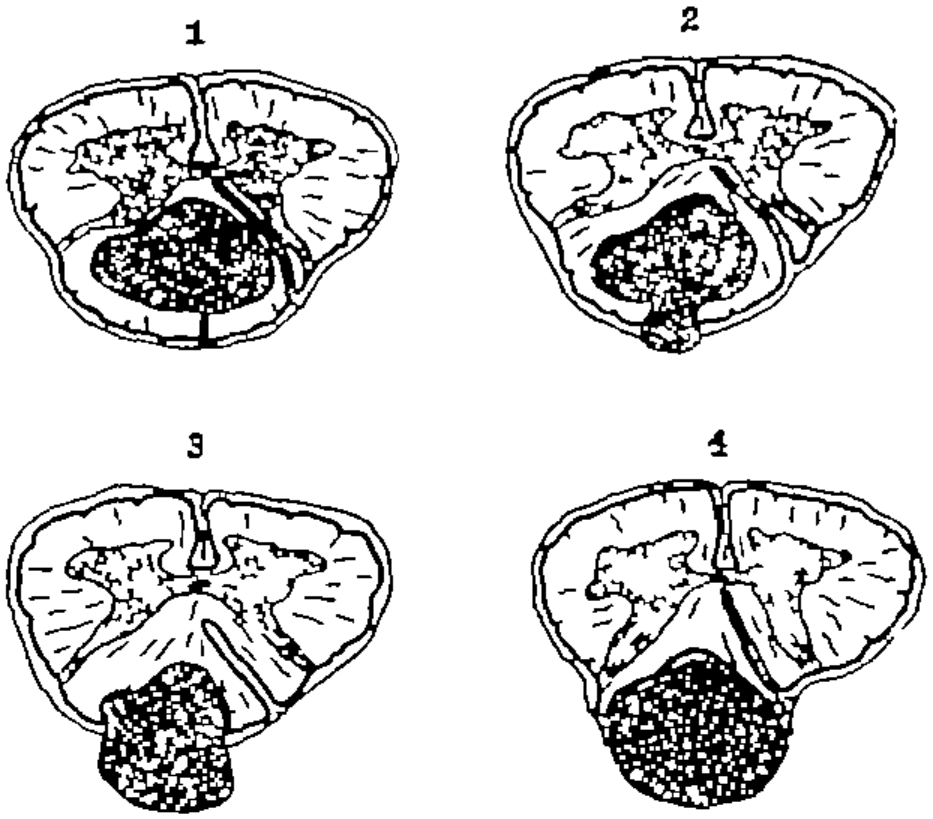


Fig 6 The extension of an intramedullary tumor after the incision of the cord has been made (diagrammatic)

conducting paths for the various sensations is still incomplete the following is a summary of all that is known

The fibers for the sensation of pain enter the cord in the posterior roots, and soon pass through the posterior horn and gray matter to the anterior part of the lateral column on the opposite side The fibers for thermesthesia take a similar course they do not cross to the other side so quickly as the pain fibers but require from two to five segments for the complete crossing The fibers for touch pass partly along the same course as the pain fibers and partly up the posterior columns on the same side to the posterior column nuclei at the extreme upper end of the cord. In these columns also lie the paths for deep muscle sense (postural recognition spacial discrimination etc) When one part of the sensory pathway in the cord is interrupted other tracts may take up the transmission of sensations. Although this is probably true for all kinds of sensation the tactile sensations especially seem to run in a bilateral path and are not so apt to be markedly affected by a purely unilateral lesion

The posterior columns, in short contain mainly fibers (endogenous and exogenous, primary and secondary paths) which contribute to the transmission of tactile and deep muscle (kinesthetic) sensations, and we must next determine the course of these tracts in the posterior columns.

As is well known the fibers from the posterior roots from below upward enter the cord and lie at first just mesial to the posterior gray horn Some of these fibers remain in the posterior column where they divide into ascending and descending branches The ascending branches give off numerous collaterals to the gray horns until the level of the next root above is reached Fibers from this second root then take their position on the mesial side of the posterior horn crowding the fibers from the preceding (lower) root more toward the median line It will be seen

Bechterew believes that sensory fibers for touch exist also in the anterior columns of the cord

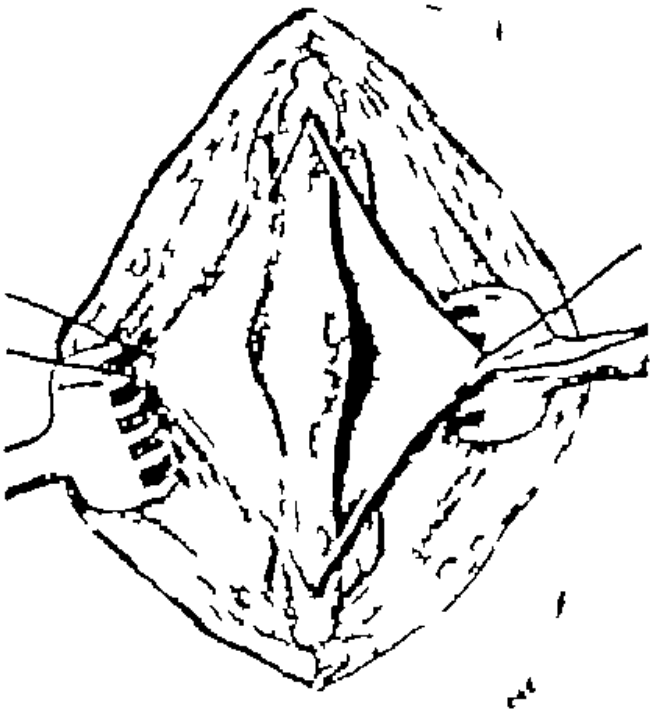


Fig 7 Case The fusiform enlargement of the cord due to intramedullary tumor

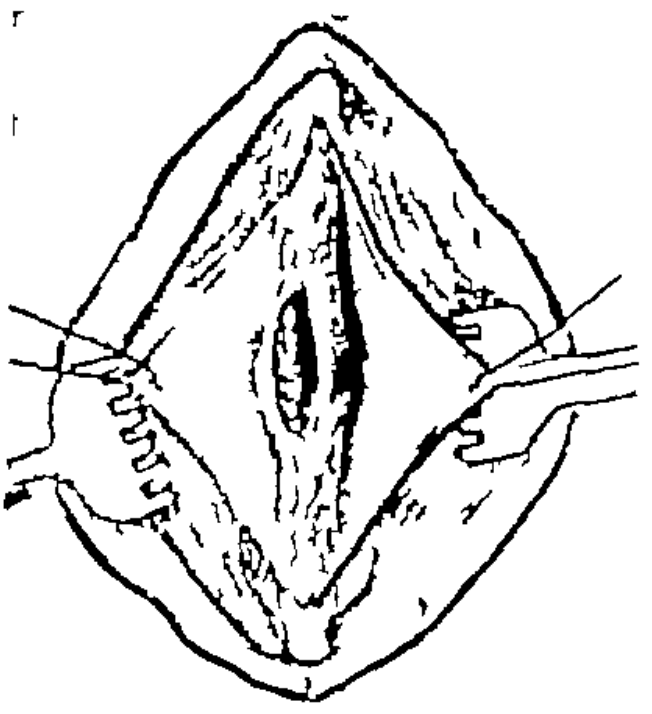


Fig 9 Case The complete extrusion of the tumor one week after incision of the cord The tumor lies outside of the cord

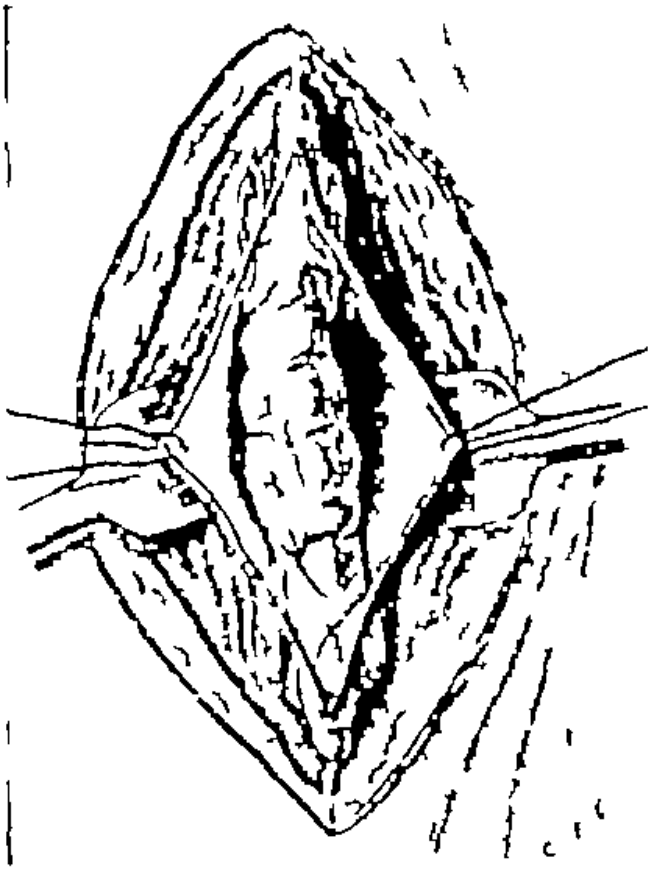


Fig 8 Partial extrusion of the intramedullary growth in Case

therefore that the fibers finally form a succession of lamellar tracts which in each case lie at first next to the posterior horn and gradually become shifted mediumward by those which enter the cord with the higher nerve roots (Schaefer) This arrangement of tracts in the dorsal columns has been studied in the lower animals by Kahler and many others while degeneration in the tracts of the cord in man have been described in detail by Schaffer Ziehen Collier and Buzzard Wickmann Schultze Petren and other

As a result of this arrangement of conducting paths in the posterior columns the fibers from the sacral posterior roots soon come to lie nearest the posterior median fissure outside of these run the lumbar root fibers outside of these the dorsal and so on (Fig 1)

In the lumbosacral region the columns of Goll and Burdach are not distinct and the fibers from the posterior roots occupy a great part of the dorsal column while in the cervical and dorsal regions the arrangement is such that the posterior median column (Goll) contains only fibers from the sacral lumbar and lowest dorsal posterior nerve roots while the postero external column of Burdach con-

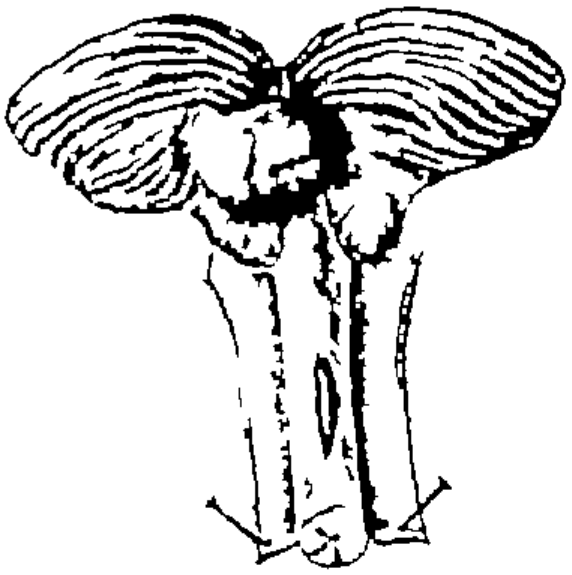


Fig. — Drawing from post mortem specimen of an intramedullary spinal tumor which has been slightly extracted. The growth extended into the medulla and had grown into the posterior fossa. Extension of the spinal growth was impossible on account of the tumor mass above. The growth was at the level of the second cervical segment, and death was due to respiratory paralysis on the day after the first operation.

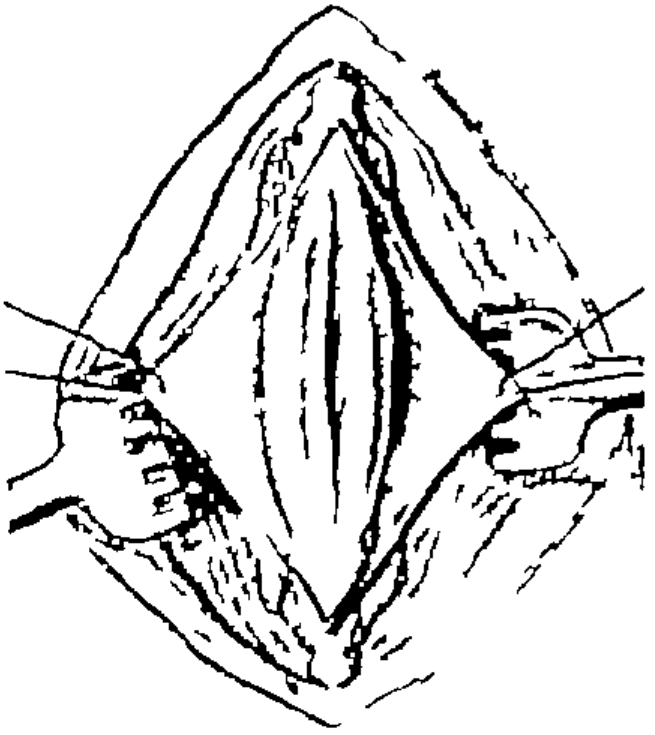


Fig. — The appearance of the cord in Case 7 after incision of the swollen cord.

tain the fibers from the upper dorsal and cervical posterior roots (Fig. 1). Therefore in the lumbosacral region an incision may be made anywhere in the posterior column. It is best made a few millimeters away from the median line so that injury may not be done to the descending tracts (triangle of Gombault and Philippe from the third sacral nerve to the conus) in the sacral region; the oval bundle of Flechsig (from the third and fourth lumbar nerves to the third sacral nerve) and the septomarginal bundle of Bruce and Muir (from the first to the third lumbar nerves) in the lumbar region. The incision should not be too near the posterior root zone lest it do damage to the marginal fibers. The deeper the incision the greater the probability of injury to fibers from the higher lumbar root.

In the dorsal and cervical region the incision should always be made in the posterior median column and the higher the level, the nearer should the incision be to the median line. In the upper and mid dorsal region the incision is best made from 2 to 4 mm. from the median line, while from the level of the mid-cervical region upward it should be

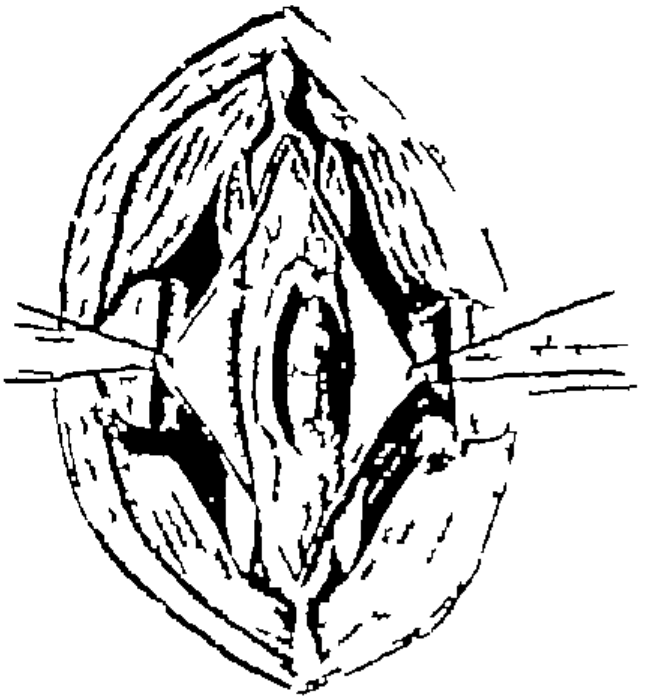


Fig. — An extramedullary tumor which has embedded in the cord. The type of growth has been mistaken for an intramedullary growth.

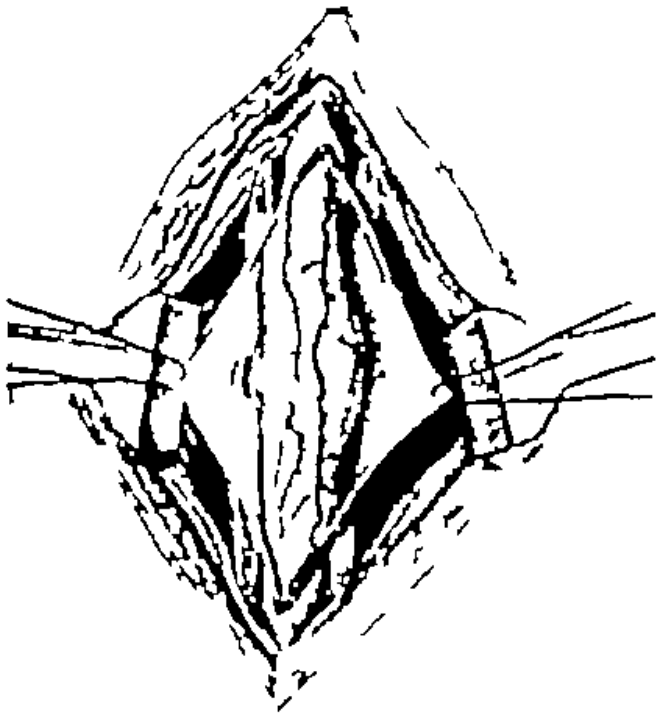


Fig 13 Case The enlarged cord due t an intramedullary tumor

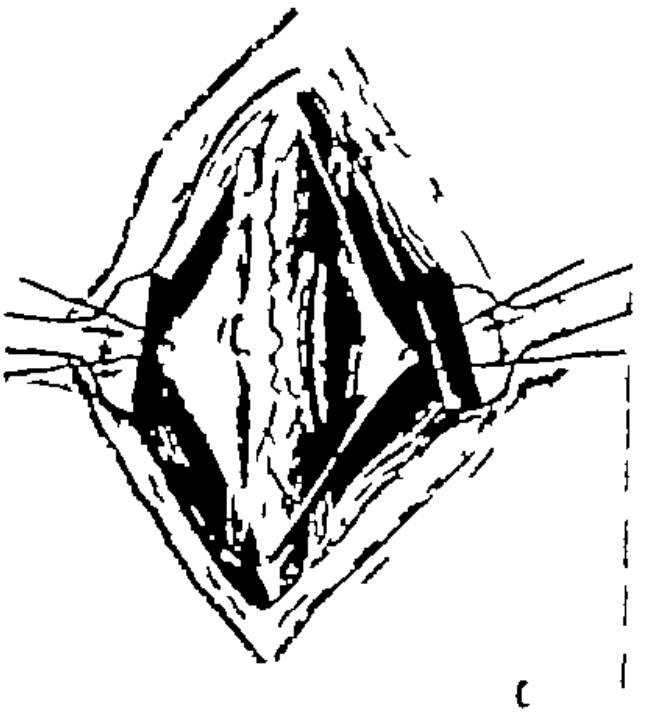


Fig 4 Case The appearance one week after incision of the cord The tumor fibrocyst has been extruded and lies on the side of the cord

made very near the median line The accompanying diagram (Fig 2) how the area in the posterior columns of the human spinal cord in which ascending degeneration occurs after injury to the sacral and lowermost lumbar posterior roots of both sides. Within the areas shaded in black an incision made in the posterior column of the one or the other side will cause a minimum of injury to nerve fibers, and few or no symptoms

It I important also to remember that in the sacral region there I very little white matter the bulk of the cord being formed of gray matter In the thoracic region there I a relatively small amount of gray matter while in the lumbar an l cervical enlargement the gray matter as well a the white column are of large size

THE TECHNIQUE OF ASPIRATION AND INCISION OF THE CORD

The cord can be punctured with a needle with entire safety provided that only the finest aspirating needle is used and care is taken not to injure even the smallest vessels which enter the cord through the posterior median septum or run in the pia mater In doing the aspiration it i advisable to make the puncture near but not through the posterior median septum. The cord must be carefully steadied as the pia offers some resistance to the entering needle A slip of the dentate ligament is grasped on each side with fine mosquito forceps and held in place Extreme care must be taken that the direction of the needle is held con tant Needles to add the cord must never be grasped with an instrument or with the fingers

For the incision of the cord a very fine scalpel such as the von Graefe knife used by the ophthalmologi t, should be used The arachnoid is first incised and grasped with fine forceps. Then the proper part of the posterior column is selected and an incision less than 0 5 cm long is made The incision must be carefull deepened and enlarged care being taken that it shall be in the long axis of the cord The enlarging and deepening of the primary incision is best done with a blunt instrument. A small strabismus hook is useful by its use fewer fibers are di ided and more are separated from each other

The incision should always be slowly made and should be stopped as soon as there is the slightest bleeding. Sponging should be done with small bits of cotton with extreme gentleness, so as to make the smallest amount of pressure upon the cord itself When a cystic collection of fluid or a small area of softening is opened no effort should be made to remove the fluid in the cavity by sponging or by pressure.[1]

THE EXPOSURE AND RECOGNITION OF INTRAMEDULLARY LESIONS

A complete laminectomy is always necessary when a thorough exploration and examination of the cord is to be made This usually means that at least three spinous processes and laminæ have to be removed, and that the laminæ shall be taken away well out to their articulating surfaces While the operation of hemilaminectomy has its field of usefulness, a wider exposure of the cord is necessary whenever a tumor has to be removed or the cord tissue has to be invaded.

After the dura has been incised, the cord is exposed covered by the pia and the arachnoid which is usually raised from the cord by fluid. The arachnoid should not be injured when the dural sac is opened and should be incised separately

It should never be difficult to recognize a tumor that lies underneath the arachnoid membrane and outside of the cord tissue and pia mater for these growths always lie superficial to the dentate ligament. It is not so easy however, to differentiate between a subpial growth closely adherent to the cord (see Figs. 4 and 12) and a true intramedullary neoplasm especially if an intramedullary tumor has broken through the posterior surface of the cord and has then pushed the pia before it. After the surgeon has incised the pia covering the tumor he may think that he is dividing cord tissue when in reality he is incising the capsule of the tumor At some of my intramedullary operations I have not been able to convince some colleagues of the true intraspinal location of the lesion because they were not sufficiently acquainted with the appearance of divided cord tissue. In several of my early operations, I was myself in doubt until I had had microscopical examinations made of post-mortem specimens, and of small bits of the tissue which lay superficial to the growth and which was incised before the growth was exposed In the cases of intramedullary cyst formation I was able to see the central canal of the cord which opened into the cyst cavity (Fig 5)

With increasing experience, one is able to clearly recognize when the soft, creamy yellow cord tissue is divided not only is its color different from that of the pia and of a capsule of a new growth, but also its consistency is very characteristic.

Careful palpation of the cord will often inform the operator that a solid tumor exists in the cord or that the enlargement is due to a collection of fluid. The majority of intramedullary tumors cause a fusiform enlargement of the cord (Fig 7) so that, as soon as the dural sac is open it is evident that the lesion is inside of the spinal marrow

THE REMOVAL OF INTRAMEDULLARY TUMORS OF THE SPINAL CORD BY THE METHOD OF EXTRUSION

The attempt to remove a growth from within the substance of the spinal cord no matter how carefully it was done, would require an amount of handling and a degree of manipulation of the delicate tissues of the cord that would, in the large majority of cases at least, be certain to be followed by a traumatic inflammation that would damage or destroy all the elements of the cord at the spot and would probably be permanent in its effects. Therefore, it was necessary to devise a new method for these intramedullary new-growths and two years ago together with Dr Beer I described a method of operation to which I gave the name the method of extrusion by means of which it is possible to remove a tumor from the substance of the cord with a minimum amount of injury to the cord tissue (Figs. 1 2 3 4, and 6)

The theory upon which the *method of extru*

[1] The cord may be raised from its bed by means of tractions on one lateral root or one slip of the denticle ligament. If the anterior surface of the cord has to be exposed this can be satisfactorily accomplished by the division of one of the slips of the denticle ligament, and traction and rotation of the cord by means of the forceps which grasps the divided slip (Fig 3) The importance of the denticle ligament very great and its exact symptoms and relations should be carefully studied by everyone interested in spinal surgery

sion is based is the following There must exist within the cord a certain intramedullary pressure as exists in all solid or fluid substances. When a tumor grows in a part of the cord the intramedullary pressure must be locally increased If an incision is made down to the growth nature will proceed to readjust the pressure conditions and in so doing will push out—the conditions being favorable—whatever has caused the local increase of pressure. When therefore an incision is made down to the tumor in the cord the tumor will be slowly pushed out of its bed and will be slowly extruded from the cord substance Nature will accomplish this process slowly—nerve fibers being slowly pushed to the sides while the growth is being extruded—and with far less injury to the cord structure than by the most careful manipulations of the surgeon

If these theoretical considerations were correct then the surgeon would only have to incise the cord down to the tumor and then have to wait for the readjustment of pressure conditions when the tumor should be found outside of the cord tissue.

In the first patient in whom I encountered an intramedullary tumor I determined to test the correctness of this theory (Case 1) At the operation the swollen cord was incised, and the incision watched for several minutes. Soon there was to be seen a bulging of a small bit of tumor mass through the incision and while we watched it, the protrusion gradually increased in size while the incision in the cord gradually lengthened. The muscles, fascia and skin were then closed by suture and the patient sent back to her bed. One week later the wound was reopened and the entire tumor was found lying outside of the cord so that after the division of a few adhesions the tumor could be removed with practically no touching of the cord itself The patient made a very good recovery

This case proved the correctness of the theoretical considerations, and we applied the method to other cases of intramedullary tumors. We have called the method the method of extrusion "

Based upon the anatomical grounds described in the early part of this paper and upon the physical process above described, I desire to recommend the method of extrusion for the treatment and removal of intramedullary tumors of the spinal cord. If after laminectomy and incision of the dura, the surgeon finds that he has to deal with an intramedullary growth he should make a short incision about 1 cm. long, in the posterior median column a few millimeters outside of the posterior median fissure at the spot where the growth seems to be nearest the surface of the cord The incision should be deep enough to divide the pia and the substance of the column down to the tumor The tumor will then begin to bulge through the incision. No matter how markedly the tumor will protrude the surgeon must not attempt to remove the growth, for fear of grave injury to the cord. The operation must be concluded for the time being the dura left wide open the muscles fascia and skin carefully closed, and the actual removal of the growth left to a second operation. After about one week, the wound is reopened, and the tumor which will in all probability be found outside of the cord can be removed by dividing the few adhesions which remain When the tumor has been removed, the opening in the pia may be closed by a few very fine (split-silk) sutures, and the dura muscles fascia, and skin closed in the usual manner

If at the second operation the tumor is found to be still closely connected with cord tissues, it is advisable to leave it *in situ* and not attempt its removal. In one instance an intramedullary fibrolipoma, I made the error of attempting to remove a small part of the tumor which was still closely connected with the cord, and caused the symptoms of a transverse lesion which had existed before the extrusion of the tumor to reappear In several later cases having learned my lesson I allowed the tumors to remain and left the dura wide open These patients have improved so much that a later operation seemed unjustifiable Cushing has had a similar experience

In the case of intramedullary tumors which extend over a large number of segments, and which infiltrate the cord substance, a small incision into the cord made in the manner above described at the level of the

most marked symptoms may allow of the partial extrusion of the tumor with amelioration of the symptoms.

Up to the present time I have applied the principles of intramedullary surgery above laid down to eleven cases of intramedullary diseases—eight cases of intramedullary tumor two cases of hydromyelia and intramedullary cyst formation and one case of syringomyelia with marked glia formation. In all of the patients who could be followed for long periods of time, there was a very decided and in some of them a very marked improvement. As most of the cases have been reported elsewhere, I shall give only the synopses of the histories in this place.

Case 1. Intramedullary glioma of the cervical cord laminectomy incision of cord extrusion of tumor removal recovery Result, very marked improvement with return of power in all extremities Patient returned to her work (Figs 7 8 and 9)

Case 2. Intramedullary glioma of cervical cord laminectomy incision of cord, extrusion of tumor removal, death in four hours from respiratory paralysis

Case 3 Intramedullary sarcoma of cervical cord laminectomy (Dr Beer) extrusion, removal, recovery Result, marked improvement later recurrence, operation, removal of recurrent tumor mass no improvement.

Case 4. Infiltrating tumor (glioma) of upper cervical cord and medulla oblongata, laminectomy and incision of cord partial extrusion of tumor death after two days from respiratory paralysis. Post mortem showed that the tumor extended into the medulla and had grown through the posterior surface into the posterior cranial fossa (Fig. 10)

Case 5. Hydromyelia, laminectomy, incision of cord, drainage of cord cavity into subdural space. Result, great improvement of complet paralysis of lower and partial paralysis of upper extremities, so that patient is up and about and has returned to his work (Fig 5)

Case 6. Intramedullary tumor of cervical cord, laminectomy incision of cord, partial extrusion of diffuse tumor of cord some improvement.

Case 7 Syringomyelia gliosis cervicalis laminectomy incision of cord in cervicodorsal region for decompressive purposes, marked improvement in power of upper extremities (Fig. 11)

Case 8. Diffuse meningomyelitis with intramedullary cyst laminectomy incision of cord, drainage of intramedullary cyst no improvement. Death three months later from exhaustion post mortem showed extensive lesions throughout dorsal and lumbar cord.

Case 9. Intramedullary lipoma of cervical cord; laminectomy incision of cord partial extrusion of tumor Great improvement so that quadriplegic patient has recovered almost complete power in the upper and much power in the lower extremities.

Case 10. Intramedullary fibrolipoma of cervical cord laminectomy incision of cord, extrusion of tumor great improvement in symptoms with disappearance of paralysis of upper and improvement in paralysis of lower extremities. Later removal of tumor which is not entirely extruded from the cord, followed by symptoms of transverse myelitis. Thereafter slow improvement.

Case 11 Intramedullary fibrocyst of cervical cord laminectomy incision of cord, extrusion of cyst, removal at second operation, almost complete recovery continuous improvement (Figs. 13 and 14)

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THE HEART IN FIBROID TUMORS OF THE UTERUS

By JOHN A. McGLINN A. B., M. D PHILADELPHIA

THE frequent association of cardiac lesions with fibromyomata of the uterus, noted both clinically and at autopsy has led to the belief that a causal relation exists between them. Many authorities have gone so far as to assume that there is a specific form of heart disease associated with these tumors, which has been designated as the fibroid heart. A review of the literature shows it to be particularly rich in the subject under discussion and with few exceptions the authors maintain the view of causal relationship. While all do not speak of a fibroid heart as an entity, still there is a more or less unanimity of opinion that such an entity exists. The universality of this opinion is expressed by Barrows (1) in a very recent article, who says, In all the literature at my command I can find but two dissenting opinions, that of Neu (2) and McGlinn (3) Other exceptions, however appear in the literature notably McDonald (4) Jaschke (5) Neu and Wolf (6) Kelly and Noble (7) Kelly and Cullen (8) Brickner (9) Rosthorn (10) and Winter (11)

The belief of causal relationship and of a fibroid heart is based principally on (a) The frequent association of organic and functional heart lesions with uterine myomata (b) deaths both before and after operation explainable only by heart failure (c) the study of a comparatively few post-mortem records of such deaths (d) conclusions based on various theories advanced to explain the causal relationship and the mode of production of the fibroid heart. The literature in support of this view is too voluminous to quote in detail but for the convenience of the readers a partial bibliography is appended. The more important articles in this class are those by Shoemaker (12) Baldy (13) Williams (14), Doane (15) Barrows, Fleck (16) Doran (17) Cumston (18) Sebileau (19) and Boldt (20)

The heart lesions most frequently described as being found are brown atrophy fatty degeneration of the myocardium, cloudy swelling, myocarditis, hypertrophy dilatation, arrhythmia and valvular disease It is not the purpose of this paper to prove that there is no connection between uterine fibroids and heart disease, but it is intended as an effort to clarify the subject and place the connection upon a rational basis. That changes take place in the heart as a direct result of uterine myomata is not to be denied. My belief in the matter is that there is no proof of the existence of a distinct fibroid heart and that all the changes which are commonly found can be explained by what might be termed accidents of the presence of the tumor Further while we believe that hemorrhages, infections degenerations, and resistance to circulation by pressure on pelvic vessels and by large tumors do produce cardiac changes, the general assumption that all the cases of degenerations hypertrophy dilatation, myocarditis and sclerotic changes found in connection with uterine myomata are due to the tumor not only lacks confirmation but the weight of the evidence is against the acceptance of this view

The present study is based on the records of 2700 autopsies made at the Philadelphia General Hospital and is supplemented by a study of 3000 autopsy records from the same source previously reported in the New York Medical Journal of June 3 1911 Of the 2700 records, 632 were those of female bodies, in 131 of which fibroid tumors of the uterus were found. In the paper previously reported 113 tumors were studied, making a total of 244 cases upon which to base this report.

Table I represents the report of 131 tumors studied from the standpoints of age, race, clinical diagnosis, position of the tumor size of the tumor associated heart lesions and associated pathological lesions of other organs.

Table II shows the heart lesions found in connection with 100 cases of uterine myomata compared with the heart lesions found in 100 other cases of the same age and race in which such tumors were not present.

The subsequent tables show these 100 cases

of fibroid tumors of the uterus, divided into ten-year age periods, compared with equal numbers of non fibroid cases of the same ages and race.

The method of collecting the cases without fibroids for comparison was as follows When a case with a uterine fibroid was found in the records, the age and race were noted. The records were then searched consecutively until a report was found of a woman of the same age and race without a fibroid No attempt was made to select cases, so that I believe these tables offer an impartial basis for comparison as to the frequency and character of heart lesions in women with and without fibroid tumors of the uterus.

In the final table, 13 additional cases between the ages of 20 and 40 are added to the 15 in the original series found between these ages The purpose of this was to eliminate the age factor as far as possible in the causation of certain lesions. It was felt that 15 cases hardly presented a fair basis for comparison

In the 632 female bodies uterine fibroids were found 131 times, or in 20 57 per cent, a rather remarkable showing of the frequency of these tumors Of the 131 women, 74 were white, 56 negroes, and 1 Indian

The average age of the women was 40.5 years, divided in age periods as follows

20 to 29 years,	5 cases,	3 84 per cent
30 to 39 years,	7 cases,	5 08 per cent
40 to 49 years,	31 cases,	24 6 per cent
50 to 59 years,	30 cases,	23 07 per cent
60 to 69 years,	3 cases,	3 84 per cent
70 to 79 years,	9 cases,	6 94 per cent
80 years and over	6 cases,	4 62 per cent

It is rather startling to note that out of the 131 cases but three (1100 1938 2527) were diagnosed clinically as fibroids of the uterus. A résumé of the cases, however will show that with but few exceptions the tumors were so small or so situated that it would have been difficult to make a diagnosis even if a pelvic examination had been made. The relatively small size of the tumors, I think gives added interest to this study because if there are changes in the heart depending upon the presence of the tumors it shows that the size and situation of the neoplasms play little or no part in the production of the changes.

The heart lesions found in the cases in Table I are as follows —

Normal hearts		7
Hypertrophy of left ventricle		4
Hypertrophy and dilatation of both ventricles		
Dilatation of left ventricle		3
General hypertrophy		35
Hypertrophy and dilatation of left ventricle		2
General dilatation		5
Dilatation of left auricle		
Dilatation of right auricle		
Myocarditis		7
Brown induration		
Soft myocardium		2
Cloudy swelling		
Aortic sclerosis		37
Pulmonic sclerosis		1
Atheroma of aorta		9
General sclerotic changes		
Chronic endocarditis		
Acute pericarditis		
Hydropericardium		3
Patulous foramen ovale		
Syphilis of heart		1
Dilatation of right heart		1
Fatty degeneration		27
Brown atrophy		5
Pale myocardium		3
Mitral sclerosis		45
Tricuspid sclerosis		4
Chronic alveolitis		2
Coronaries sclerotic		
Acute endocarditis		
Subendocardial hemorrhage		
Chronic pericarditis		6
Tubercular pericarditis		
Atrophy of heart		
Sarcoma of heart		
Total variety of lesions	35	
Total number of lesions	300	
		— 3

In considering the possible relation of the fibroid tumors to these lesions it may be well to discuss at the same time the various theories which have been advanced to explain the relationship Among which are —

First Hæmorrhages become the cause of great weakness, and the heart, being poorly nourished degenerates.

Second Anæmia resulting from hæmorrhages is responsible for the degenerations and dilatations.

Third More or less constant loss of blood will produce fatty degeneration and brown atrophy

Fourth. Changes in the heart muscle may result from alterations in the blood pressure incident to hæmorrhages.

Fifth A toxin produced during the growth of the tumor causes degenerative changes in the heart and blood-vessels.

Sixth Fibroid tumors of the uterus are only a local feature of a general process.

Seventh. Poisonous products are produced by the growly changed ovaries present in fibroid tumors, and these acting on the heart cause the various degenerations.

Eighth. Heart lesions are secondary to changes produced in the kidneys by pressure on the ureters.

Ninth Hypertrophy results because the heart has added work to perform to supply the tumor with blood.

Tenth. Pressure on the vessels in the pelvis increases circulatory resistance and leads to hypertrophy of the heart

Eleventh. Infections of the tumor may lead to secondary degenerative heart changes

Twelfth Infections of the bladder may *ascend and affect the kidneys and in turn* give rise to degenerative heart changes.

Thirteenth Pain influences the regularity of the heart's action Pain in fibroids produces arrhythmia.

Fourteenth Pressure of the tumor on the sympathetics may produce arrhythmia.

Fifteenth A reflex from the uterus may influence by centripetal action a certain point of the nervous centers which is transmitted *centrifugally to the arterioles from* this results a contraction of these arterioles, an exaggeration of pressure in the small circulation and an excess of work to the heart to which it succumbs" (Potain)

In considering the possibility of the existence of a fibroid heart, all these theories can be dismissed with the exception of the fifth and sixth. Manifestly none of the others are applicable to all cases of fibroid tumors.

Considering then the only two rational theories namely that the tumor in its growth develops a toxin which affects the heart, and that the fibroid tumor is only a local manifestation of a general process, it is reasonable to assume that if either of these theories were true, the heart would show some distinct change which would be common to all cases. This study proves that this is not so We find in Table I that there are 35 *distinct lesions, no one of which (mitral sclero*sis) occurs in more than 45 of the cases. The same thing is true in the second series of 100 cases (Table II) in which there are 30 distinct lesions no one of which (mitral sclerosis) occurs in more than 57 of the cases.

Again If the heart changes *were dependent* upon a toxin elaborated by the tumor we should expect to find the extent of the changes depending upon the size of the tumor as it is reasonable to assume that a large tumor would generate more toxic matter than a small one *Per contra* if a fibroid tumor of the uterus is simply a local manifestation of a general process, we should find the largest tumors in those cases which show the greatest changes in the cardiovascular system. A study of Table I does not bear out these contentions. Thus in case No. 525 with one subserous tumor measuring 15 cm. in diameter the heart weighed 550 gms. and showed *hypertrophy and fatty degeneration, while in* No 1100, with a tumor weighing 1630 gms., the heart weighed but 320 gms. and the only change recorded was myocarditis. Similar comparisons can be made between Nos 260 and 511 937 and 989 1707 and 1951 2160 and 2186 etc.

It may be argued that in both these series there is a more or less constant change in the cardiovascular system namely that of *sclerosis To a certain extent this is true* thus in Tables I and II totaling 231 cases, we find 541 lesions of which 326 or 60 3 per cent, are sclerotic in character If we study the first series we find that of the 131 cases, 108, or *82.44* per cent occurred after the age of 40 years a period in which sclerotic changes of the cardiovascular system are the rule and not the exception This relationship of age to sclerotic changes in the heart and vascular system is best shown in the second series under Tables III IV V VI VII VIII, IX, X These tables are arranged in various age groups of ten years to show the heart changes in fibroid tumors at various ages compared with the heart changes in an equal number of non fibroid cases of the same age and race.

In the second series of 100 cases of fibroids 195 sclerotic lesions were found and exactly the same number were present in the non *fibroid cases.* In all the age periods beyond 40 years, with the exception of the period between 70 and 79 not only were the sclerotic

changes more common in the non-fibroid cases, but all cardiac lesions were in excess of the fibroid ones.

In Table V, which represents 28 cases of fibroids compared with the same number of non fibroids between the ages of 20 and 40 years, we find that the heart lesions in the fibroid cases are far in excess of those in the non-fibroid ones. From this it may be argued that eliminating the age factor fibroids do produce sclerotic changes. This inference I do not believe to be justified. The number of cases for comparison is entirely too small upon which to base a just conclusion. Again if it is argued that fibroids do produce sclerotic changes of the heart, they must be considered selected cases and if compared with another series of selected cases such as interstitial nephritis, the heart lesions in the latter will far outnumber those found in the former The number of non fibroid cases in this table could not have been better selected to show the absence of sclerotic changes, as in only 6 of them (uræmia, 4 syphilis 2) were any lesions present which could produce such changes.

In the two series there were 50 cases of fibroids between the ages of 20 and 40. Sclerotic changes were noted in 22 of these cases and absent in 28 In Table I, the largest tumors were in those cases which showed no sclerotic changes. The smallest tumors were associated with the most marked sclerotic changes. Again in Table I the sclerotic lesions numbered 17 divided among 11 cases In these same cases were such lesions as syphilis arteriosclerosis cirrhosis of the liver and acute and chronic nephritis which might be held responsible for the sclerotic changes in the heart. Therefore in view of the fact that sclerotic changes in the heart were not a constant finding that the largest tumors were not associated with such changes and that other lesions were present to account for the sclerosis I believe that we are justified in assuming that no relationship between them can be proven

No other one lesion occurs frequently enough to be considered as a typical heart change depending upon the presence of the uterine tumor Let us consider briefly however those lesions which are most frequently ascribed to the fibroid, hypertrophy dilatation, fatty degeneration, brown atrophy cloudy swelling and myocarditis.

Hypertrophy was found as follows in the first series of cases General, 35 hypertrophy of left ventricle, 4 hypertrophy with dilatation of the left ventricle 2 hypertrophy with dilatation of both ventricles 1 a total of 42 times. Theories eight and nine can only be considered in the discussion of the cause of hypertrophy theory fifteen is entirely too fanciful to receive serious consideration. In only six of the cases in Table I (512 551 1003 1938 1991 2186) was the tumor of such a size as to increase the work of the heart, or so situated as to cause pressure and increase circulatory resistance. In none of the other cases was the tumor larger than 4 cm. and in the majority of cases it was 2 cm. or less. It is evident, then that the hypertrophy in the other 36 cases must have been independent of the fibroid. A little study of Table I will show that in these cases the tumor has nothing to do with the production of cardiac hypertrophy and that it was caused by conditions entirely foreign to the myomata. Thus in case No 509 we find the hypertrophy due to disease of the mitral valve and arteriosclerosis of the kidneys. Again in case No. 512 the lesion was secondary to mitral and aortic valvular disease and sclerotic kidneys. Practically the same causes can be shown in Nos. 551 891 1051 1134, 1313 1680 etc. In other cases different lesions can be shown to have been the cause Thus in cases Nos. 709 937 and 1011 atrophic cirrhosis of the liver was the underlying cause of the hypertrophy In cases Nos. 1026 1051 1134 1324 1476 etc. the primary cause was arteriosclerosis. Other cases can be cited in Table I, where still other conditions, entirely foreign to the myomata were the cause of the cardiac hypertrophy Table II shows that hypertrophy was practically as frequently met with in the non fibroid as in the fibroid cases—29 in the former and 34 in the latter

While we can accept the theory that fibroid tumors of the uterus do cause cardiac hypertrophy I believe that we must conclude that all cases of hypertrophy found in connection

with such tumors are not produced by them and that the only manner in which they can produce such a heart lesion is in the manner set forth in theories numbers eight and nine.

In Table I cardiac dilatation affecting the whole or a part of the heart was present in 32 of the cases. In Table II dilatation was noted in 9 of the fibroid cases and in 21 of the non-fibroid. Such an unstable lesion can hardly be considered as a specific form of cardiac disease especially as it occurred more frequently in cases without tumors than in those with tumors. That it may be secondary to hypertrophy and fatty degeneration, which in some cases are dependent upon the tumor is admitted, but that its presence can always be accounted for by the fibroid is denied. The usual cause of cardiac dilatation is valvular disease. In Table I dilated hearts are noted in cases Nos. 709, 1383, 1476, 1760, 1951, 2549, 2660, and 2856 which are independent of sclerotic valvular disease and are apparently dependent upon fatty degeneration of the myocardium. In 5 of these cases (1388, 1476, 1760, 2660, 2856) however the tumor was so small and so situated that it could hardly be responsible for the fatty degeneration. Thus in the entire series of cases we have but three examples of the lesion where the tumor was the likely cause.

Fatty degeneration of the heart was present in 27 of the 131 cases in the first series. This lesion is commonly found in connection with hypertrophy and dilatation, in anæmic and cachectic states, and after the age of 40. The mode of production of fatty degeneration of the heart by fibroid tumors of the uterus can only be explained by anæmia from loss of blood, infections of the tumor or surrounding structures, malignant degenerations, a specific toxin and secondary to hypertrophy and dilatation. As we have already proven that hypertrophy and dilatation are seldom the direct result of the tumors, and that there is no reason to believe in the presence of a specific poison and as no cases of malignant degeneration or infection are reported in this series, it remains but to show how many of the cases were dependent upon anæmia resulting from hæmorrhages. In ten of the 27 cases of fatty degeneration the tumor was so situated and of such a size as would likely produce hæmorrhage (Nos. 221, 571, 709, 713, 1488, 1528, 1850, 2220, 2773). In one of these cases (No. 1850) the anæmia was due to ulcerative enterocolitis, the case being recorded as one of pernicious anæmia due to the intestinal condition. In the other 9 cases the ages vary from 46 to 83 years, so that in some the hæmorrhages must have ceased and the body recovered from the anæmia. Ignoring these factors for the sake of argument, we have but 10 out of 131 cases in which the tumor could have been responsible in any way for the fatty degeneration. In Table II we find that this lesion was more common in the non-fibroid than in the fibroid cases.

A fair conclusion in reference to this lesion would be that while under certain circumstances fatty degeneration of the heart may be caused by fibroid tumors of the uterus, all cases of this lesion found in connection with such tumors cannot be ascribed to them.

Brown degeneration of the heart was noted in 6 cases in Table I and in 7 in Table II, a total of 13 in 231 cases. The usual cause of this condition is old age and advanced valvular disease. In Table I, brown atrophy is found in cases Nos. 238, 811, 1254, 2349, 2557 and 2768. The ages of these cases are 65, 78, 57, 67, 84 and 53. In all except No. 238 advanced age or sclerotic valvular changes are present to account for the presence of the lesion. In case 238 the age (65) may be considered advanced enough in itself to account for the lesion but the fact that the woman also had advanced cancer and that the fibroid was very small would eliminate the tumor as the cause of the condition in this case. Thus in this entire series we do not find a single case of brown atrophy which was likely produced by the fibroid tumor. In fact, the lesion appears so seldom in connection with fibroid tumors that it can hardly be considered anything but a casual lesion.

Cloudy swelling of the myocardium is noted in ten of the cases in Table I, and in two in Table II, a total of 12 in the entire series. The usual cause of cloudy swelling is an intoxication. In all the cases in Table I (464, 1525, 1615, 1718, 1800, 2125, 2220, 2339, 2766, 2858) some disease capable of and usual

ly producing severe systemic intoxication was present peritonitis, pneumonia, tuberculosis and nephritis. With these diseases present to produce the condition and it being so infrequent, I hardly believe that it can ever be ascribed to fibroids except in event of infections or malignant degenerations.

Chronic myocarditis occurs in 27 of the cases in Table I, and in 15 in Table II a total of 42 times in 231 cases. In Table II it is shown that chronic myocarditis is no more common in fibroid than non fibroid cases. Chronic or fibroid myocarditis is frequently associated with sclerotic changes in the coronary arteries and valves It is common late in life and is secondary to various intoxications. While we may assume that myocarditis may result from infections and degenerations of a fibroid tumor in order to prove that it did result entirely from the tumor in a given case we would have to eliminate the usual causes of its production In Table I there is no record of infection of the tumor and no degeneration except calcification. In all the cases of myocarditis recorded there are lesions present in the heart or other organs which could produce the condition We are safe in saying that in this series there is not a single case of myocarditis which could be attributable to the tumor When we find that myocarditis is just as common in cases without fibroids as in those with them, and when infections and degenerations of the tumors which might produce it are so rare, it must be concluded that this lesion depending entirely upon the presence of a myomata, must be extremely uncommon.

It is impossible from a study of this character to present much data in relation to the association of arrhythmia and with fibroids That arrhythmia does occur is of course acknowledged but is it not fair to assume that in the majority of cases it is a symptom of the myocarditis which is so frequently present and which bears no relation to the presence of the tumor?

Other heart lesions, not usually described, may result from a fibroid tumor such as infections of the endocardium and pericardium from infections of the tumor and metastases in the case of malignant degeneration, but these would be extremely rare and would be purely accidental

The number of cases studied in this report is, I believe sufficient upon which to base the following conclusions

First From this report a definite entity of a fibroid heart cannot be sustained.

Second If the fibroid tumors of the uterus were the cause of all the heart lesions described in this study then every tumor regardless of its size and situation, should be removed—a contention that the most radical would hardly admit.

Third Uterine myomata, occurring in middle and advanced life are practically always associated with sclerotic heart lesions. These lesions are a part of a general process and bear no relation to the fibroid.

Fourth. Large tumors, by increasing the work of the heart, and tumors causing pressure on the pelvic circulation may produce hypertrophy and secondary dilatation of the heart.

Fifth Anaemia, from hæmorrhages infections and certain degenerations of the tumor may affect the heart secondarily causing changes such as fatty degeneration brown atrophy and cloudy swelling.

Sixth. The majority of cases of fatty degeneration, brown atrophy cloudy swelling, myocarditis, etc. found in connection with fibroid tumors of the uterus are not caused by the tumor but by conditions entirely foreign to the tumor

TABLE I

Autopsy No. 1 White, age 53. Clinical diagnosis Hemiplegia, uræmia. Position of tumor: One submucous polyp. Size of tumor 1 cm. Heart condition Weight (?) fatty Associated pathological findings General arteriosclerosis chronic interstitial nephritis.

Autopsy No 38. White age 65. Clinical diagnosis Cholecystitis. Position of tumor: One interstitial. Size of tumor cm. Heart condition. Weight, 145 gms Brown induration of myocardium. Associated pathological findings: Cancer of kidney metastases t liver lung and pleura.

Autopsy No. 244. White, age 59. Clinical diagnosis Cancer of stomach. Position of tumor: Few interstitial one submucous Size of tumor: Small. Heart condition Weight, 320 gms Interstitial myocarditis mitral sclerosis. Associated

pathological findings Cancer of sigmoid, metastases to liver fatty liver gall-stones chronic parenchymatous nephritis.

Autopsy No. 260. White, age 66. Clinical diagnosis Abdominal aneurism arteriosclerosis Position of tumor: One subperitoneal. Size of tumor Small. Heart condition Weight 480 gms. Acut vegetative endocarditis chronic endocarditis. Associated pathological findings Arteriosclerosis.

Autopsy No. 262 White age 42. Clinical diagnosis: Cirrhosis of liver Position of tumor: One subserous. Size of tumor 1¼ cm. Heart condition Weight, 310 gms. Pericarditis mitral sclerosis. Associated pathological findings Gall stones cirrhosis of liver; chronic interstitial nephritis.

Autopsy No. 264. Black, age 30. Clinical diagnosis Pulmonary tuberculosis. Position of tumor One subserous. Size of tumor 5 cm. Heart condition Weight 300 gms. Hydropericardium sclerotic mitral and tricuspid valves myocarditis. Associated pathological findings Miliary tuberculosis subacute nephritis acute gastritis tubercular enteritis.

Autopsy No. 345. White, age 78. Clinical diagnosis Mitral regurgitation. Position of tumor One subserous. Size of tumor 3 cm. Heart condition Weight, 380 gms. Myocarditis chronic mitral endocarditis atheroma of aorta, patulous foramen ovale. Associated pathological findings Chronic diffuse nephritis.

Autopsy No 464. Black, age 4 Clinical diagnosis Tubercular peritonitis. Position of tumor Multiple Size of tumor (?) Heart condition Weight (?) Cloudy swelling Associated pathological findings chronic purulent peritonitis.

Autopsy No. 478. White, age 46 Clinical diagnosis Hemiplegia myocarditis Position of tumor One subserous. Size of tumor Small. Heart condition Weight 90 gms Sclerotic mitral and aortic valves atheroma of aorta Associated pathological findings Œdema of meninges

Autopsy No 509 Black, age 4 Clinical diagnosis Nephritis Œdema of lungs Position of tumor Many interstitial and subserous. Size of tumor Small Heart condition Weight, 400 gms Hydropericardium hypertrophy and dilatation of left ventricle sclerosis f mitral valve and coronary arteries. Associated pathological findings Gall stones arteriosclerotic kidney tubercular mesenteric lymph nodes.

Autopsy N 5 Black, age 45. Clinical diagnosis Chronic nephritis. Position of tumor One subserous. Size of tumor Large. Heart condition Weight, 500 gms. Normal heart. Associated pathological findings: Acut parenchymatous nephritis

Autopsy No. 5 Black, age 56. Clinical diagnosis Uræmia endocarditis. Position of tumor One interstitial. Size of tumor Large Heart condition Weight, (?) Hypertrophy and dilatation of ventricles sclerosis of mitral and aortic valves atheroma of aorta. Associated pathological findings Hemorrhagic pancreatitis arteriosclerotic kidneys.

Autopsy No. 510. Black, age 75. Clinical diagnosis Pericarditis pneumonia. Position of tumor Two subserous. Size of tumor: Walnut. Heart condition Weight, 350 gms. Hypertrophy pericarditis atheroma of aorta. Associated pathological findings Echinococcus cyst of liver arteriosclerosis of kidneys.

Autopsy No. 5 5. White, age 48. Clinical diagnosis Myocarditis nephritis, anasarca. Position of tumor One subserous. Size of tumor 1½ cm. Heart condition Weight, 550 gms. Hypertrophy fatty degeneration. Associated pathological findings Gall stones fatty liver obesity chronic nephritis.

Autopsy No. 537 White, age 44. Clinical diagnosis Transverse myelitis. Position of tumor: One subserous. Size of tumor Small Heart condition Weight, 250 gms. Slight sclerosis of aortic valve. Associated pathological findings Fracture of spine arteriosclerosis.

Autopsy No. 55 White, age 66. Clinical diagnosis Myocarditis chronic interstitial nephritis. Position of tumor multiple. Size of tumor Largest, 6 cm. Heart condition Weight, 650 gms. Hypertrophy sclerosis of mitral and aortic valves atheroma of aorta. Associated pathological findings Nutmeg liver chronic nephritis hydrothorax.

Autopsy No. 571 White, age 49. Clinical diagnosis Myocarditis pneumonia anæmia chronic nephritis. Position of tumor One subserous polyp Size of tumor 4 cm. Heart condition Weight, 360 gms. Fatty infiltration. Associated pathological findings Arteriosclerosis chronic interstitial nephritis fatty liver gastritis acute enteritis.

Autopsy No. 589 Black, age 34. Clinical diagnosis Cerebrospinal syphilis phthisis nephritis Position of tumor One subserous. Size of tumor Large Heart condition Weight, 30 gms. Soft and flabby myocardium. Associated pathological findings Cancer of lung, liver and pancreas chronic diffuse nephritis.

Autopsy No 6 6 White age 64. Clinical diagnosis Pneumonia myocarditis nephritis Position of tumor One interstitial. Size of tumor ½ cm. Heart condition Weight, 310 gms. Chronic myocarditis, fatty degeneration. Associated pathological findings Chronic interstitial nephritis with acute exacerbation fatty liver

Autopsy No 666 Black, age 34 Clinical diagnosis Myocarditis nephritis Position of tumor One subserous polyp. Size of tumor ¾ in. Heart condition Weight, 800 gms Myocarditis valvular endocarditis atheroma of aorta. Associated pathological findings Atrophic cirrhosis of liver chronic interstitial nephritis enteritis.

Autopsy No 685 Black, age 53. Clinical diagnosis Myocarditis hronic nephritis. Posi-

tion of tumor Two submucous polyps Size of tumor 1 cm Heart condition Weight 530 gms. Dilatation sclerotic changes Associated path ological findings Arteriosclerosis diffuse e phritis papilloma of ovary

A topsy N 688 Black, age 38 Clinical diagnosis Myocarditis nephrit Position of tumor One submucous Size of tumor 4 cm Heart condition Weight, 520 gms F broid myocarditis hypertrophy f left entricle Associated pathological findings Pleurisy with effusion chron ic diffuse nephritis

Autopsy \ 09 White, age 83 Clinical diagnosis Jacksonia epilepsy endocarditis ne phritis Position of tumor Several submucous polyps. Size f tumor Small Heart condition Weight, 500 gms. Fatty heart hypertrophy and dilatation. Associated pathological findings Chronic inter stitial nephritis cirrhosis of liver softening of brain

A topsy N 3 White, age 75 Clinical diagnosis Myocarditis nephritis arteriosclerosis. Position of tumor One submucous Size of tumor 1¼ cm Heart condition Weight, 50 gms F tty degeneration. Associated pathological find ings Chronic interstitial nephritis.

Autopsy No 764 White age 55 Clinical diagnosis Nephritis endocarditis arteriosclerosis pneumonia pseudobulbar palsy Position of tumor One submucous Size of tumor ¼ cm Heart condition Weight 320 gms F tty infiltration Associated pathological findings Chronic diffuse nephritis arteriosclerosis

Autopsy \ 8 Whit age 78 Clinical diagnosis Œdema of lungs arteriosclerosis Posi tion of tumor One submucous polyp Size of tumor 4 cm Heart condition Weight 80 gms Brown trophy chronic endocarditis Associated pathological findings General rteriosclerosis chronic interstitial and parenchymatous nephritis

Autopsy No 85 Black, age 69 Clinical diagnosis Hemiplegia chroni interstitial nephritis mitral valvulitis Position of tumo Multiple Size of tumor (?) Heart conditio Weight 290 gms Chronic endocarditis orti sclerosis Associated pathological findings Parenchymatous nephritis

Autopsy \ 867 White, age 43 Clinical diagnosis Alcoholism delirium tremens Position of tumor One interstitial Size f tumor cm. Heart conditio Weight 260 gms F tty heart chronic alvulitis Associated pathological find ings Fatty kidneys colitis gastritis

Autopsy N 89 White age 29 Clinical diagnosis Myocarditis hypertrophy Position of tumor Tw subperitoneal Size of tumor Millet seed Heart condition Weight, 360 gms Mitral stenosis and regurgitation hypertrophy and dilata tion Associated pathological findings Subacute hemorrhagic nephritis Passive congestion kidneys

Autopsy N 903 White age 6 Clinical diagnosis Brain tumor Position of tumor Four subperitoneal Size of tumor Walnut Heart condition Weight, 160 gms Chronic valvulitis. Associated pathological findings chronic inter stitial nephritis.

Autopsy No. 937 Black, age 41 Clinical diagnosis Myocarditis cirrhosis of liver chronic parenchymatous nephritis. Position of tumor N merous Size of tumor Small. Heart condition Weight, 520 gms Hypertrophy; hydropericardi um endocarditis, myocarditis atheroma of aorta. Associated pathological findings Syphilitic cirrho sis of li er ascites passi congestion of kidneys.

Autopsy No 989 Black, age 59 Clinical diagnosis F broid of uterus T B of lungs, chronic nephritis tricuspid regurgitation. Position of tumor Several interstitial. Size f tumor 5 x cm Heart condition Weight, 380 gms. Chronic myocarditis chronic endocarditis Associated path ological findings Chronic diffuse nephritis

Autopsy N 996 White, age 53 Clinical diagnosis Cancer of stomach Position of tumor Several interstitial. Size of tumor cm. Heart condition Weight, 240 gms. Moderate fatty degeneration mitral and aortic valvulitis atheroma of aorta. Associated pathological findings Chronic diffuse nephritis gall-stones

Autopsy No. 003 White age 46. Clinical diagnosis Nephritis aneurism of innominate. Position of tumor One subperitoneal. Size of tumor Large. Heart condition Weight, 480 gms Hypertrophy and dilatation chronic ortic val vulitis chronic pericarditis.

Autopsy No. 10. White age 47 Clinical diagnosis Myocarditis, cancer of omentum. Posi tion of tumor Multiple Size of tumor Largest, 3 cm Heart condition Weight, 27 gms. Early myocarditis. Associated pathological findings Cancer of ovary and omentum chronic diffuse ephritis

Autopsy No. Black, age 36 Clinical diagnosis Myocarditis, hypertrophy mitral and aortic valvulitis Position of tumor Many sub serous one interstitial Size of tumo Largest, 4 cm Heart condition Weight 6 gms Hyper trophy of left ventricle incompetent mitral and aortic val es. Associated pathological findings Cirrhosis of liver chronic diffuse nephritis.

A topsy N 8 White, age 6 Clinical diagnosis Senility arteriosclerosis Position of tumor One subseros calcified. Size of tumor Small Heart condition Weight, 240 gms. Fatty heart chronic aortic valvulitis. Associated path ological findings Pneumonia tuberculosis of lungs and kidneys, chronic diffuse nephritis.

Autopsy N 26. White, age 65. Clinical diagnosis Hemiplegia myocarditis, nephritis ar teriosclerosis Position of tumor Multiple. Size of tumor Largest 5 x 3 cm. Heart condition Weight 4 0 gms Hypertrophy left ventricle. Associated pathological findings General arterio sclerosis pneumonia chronic diffuse ephritis cerebral hemorrhage

Autopsy No. 5 Black, age 6 Clinical diagnosis Hemiplegia myocarditis arteriosclero-

sis. Position of tumor: One intraligamentous. Size of tumor Small. Heart condition Weight, 320 gms. Hypertrophy; chronic valvulitis tuberculous pericarditis. Associated pathological findings General arteriosclerosis, subacute diffuse nephritis tubercular mediastinal lymph nodes.

Autopsy No. 056. White, age 66. Clinical diagnosis Dysentery enteritis myocarditis, arteriosclerosis. Position of tumor: One submucous polyp Size of tumor Small. Heart condition: Weight 270 gms. Chronic valvulitis. Associated pathological findings Ulcerative enteritis.

Autopsy No. 1081 Black, age 54. Clinical diagnosis Tuberculosis of lungs and peritoneum. Position of tumor One subperitoneal. Size of tumor: cm. Heart condition Weight, 3 0 gms. No lesions. Associated pathological findings Chronic parenchymatous nephritis fatty liver

Autopsy No. 1098. White, age 54. Clinical diagnosis Tuberculosis of lungs Position of tumor One. Size of tumor ½ in. Heart condition Weight, 290 gms No lesions. Associated pathological findings Tuberculosis of lungs.

Autopsy No. 1100. Black, age 30. Clinical diagnosis Fibroid of uterus. Position of tumor One subserous. Size of tumor Weight, 630 gms. Heart condition Weight, 310 gms. Myocarditis. Associated pathological findings Parenchymatous nephritis.

Autopsy No. 1 34. Black, age 35. Clinical diagnosis Uræmia parenchymatous nephritis. Position of tumor Four subperitoneal two submucous. Size of tumor ½ to 1½ cm. Heart condition: Weight, 400 gms Hypertrophy chronic valvular disease. Associated pathological findings Chronic diffuse nephritis arteriosclerosis cerebral hæmorrhage.

Autopsy No. 1243. Black, age 42 Clinical diagnosis Cerebral tumor nephritis myocarditis. Position of tumor Two subperitoneal. Size of tumor 2 cm. Heart condition Weight, 490 gms. Chronic myocarditis chronic valvulitis sclerosis of coronaries. Associated pathological findings Arteriosclerosis chronic interstitial nephritis

Autopsy No. 1252 Black, age 65. Clinical diagnosis Hemiplegia pneumonia endocarditis myocarditis nephritis. Position of tumor Many subperitoneal Size of tumor Large and small. Heart condition Weight, 530 gms. Sclerotic aortic valve, theroma of aorta. Associated pathological findings Chronic interstitial nephritis

Autopsy No. 1 54. Indian age 57 Clinical diagnosis Pneumonia chronic nephritis Position of tumor One Size of tumor Small. Heart condition Weight, 280 gms. Muscle brown and flabby slight sclerosis of mitral valve Associated pathological findings Pneumonia gall-stones diffuse nephritis.

Autopsy No. 1313. White, age 60 Clinical diagnosis. Arteriosclerosis, uræmia Position of tumor Two subperitoneal. Size of tumor Chestnut. Heart condition Weight, 320 gms. Fatty dilatation and hypertrophy sclerosis of aortic valve. Associated pathological findings Tumors of right kidney sternum, left lung chronic parenchymatous nephritis.

Autopsy No. 320. White, age 104. Clinical diagnosis Myocarditis; nephritis; senility Position of tumor: One. Size of tumor Egg Heart condition. Remarkably normal heart for age. Associated pathological findings Pneumonia stone in kidney; mystic kidney

Autopsy No. 1324. Black, age 42. Clinical diagnosis Mitral and aortic disease Position of tumor One subperitoneal. Size of tumor Small Heart condition: Weight, 600 gms. Hypertrophy and dilatation. Associated pathological findings: General arteriosclerosis chronic interstitial nephritis.

Autopsy No. 350. Black, age 40. Clinical diagnosis Pulmonary and meningeal tuberculosis. Position of tumor Multiple. Size of tumor (?) Heart condition Weight, 30 gms. Slight pulmonic sclerosis. Associated pathological findings Miliary tuberculosis.

Autopsy No. 388. Black, age 50. Clinical diagnosis: Acute dilatation of heart laryngeal growth. Position of tumor Multiple. Size of tumor Large. Heart condition Weight, 340 gms. Acute dilatation myocarditis. Associated pathological findings Gumma of lungs and vocal cords passive congestion of kidneys.

Autopsy No. 1450. White, age 74. Clinical diagnosis Myocarditis arteriosclerosis diffuse nephritis. Position of tumor: One subperitoneal nodule. Size of tumor cm. Heart condition: Weight, 530 gms. Chronic myocarditis; chronic indurated valvulitis. Associated pathological findings General arteriosclerosis.

Autopsy No. 476. White, age 65. Clinical diagnosis Cerebral hæmorrhage, myocarditis; chronic diffuse nephritis cardiac dilatation. Position of tumor One interstitial nodule. Size of tumor Pigeon egg Heart condition Weight (?). Hypertrophy and dilatation fatty degeneration of heart. Associated pathological findings Chronic diffuse nephritis gall-stones general arteriosclerosis; œdema of the brain.

Autopsy No 488 White, age 53. Clinical diagnosis Pneumonia uræmia. Position of tumor Two interstitial. Size of tumor 3 and 7 cm. Heart condition Weight, 500 gms. Fatty degeneration Associated pathological findings Chronic diffuse nephritis parenchymatous degeneration of liver acute pancreatitis.

Autopsy No. 504. White, age 60. Clinical diagnosis. Myocarditis arteriosclerosis chronic valvulitis, chronic diffuse nephritis Position of tumor Two subperitoneal Size of tumor and 4 cm. Heart condition Weight, 350 gms Fatty degeneration sclerosis of mitral and aortic valves atheroma of aorta

Autopsy No. 15 5 Black, age 40. Clinical diagnosis. Apoplexy; myocarditis pneumonia.

Position of tumor Multiple; some necrotic. Size of tumor 3 to 9 cm. Heart condition Weight, 556 gms. Cloudy swelling. Associated pathological findings Chronic diffuse nephritis gall-stones head not opened.

Autopsy No. 1526. White, age 8 Clinical diagnosis Myocarditis bronchitis, chronic interstitial nephritis. Position of tumor Several submucous nodes. Size of tumor 4 cm. Heart condition Weight, 320 gms. Chronic myocarditis. Associated pathological findings Chronic interstitial nephritis fibroma of left kidney hemorrhagic cystitis

Autopsy No. 1538. White age 72. Clinical diagnosis Cancer of uterus myocarditis diffuse nephritis arteriosclerosis. Position of tumor One large subperitoneal node. Many small submucous nodes which are gangrenous. Size of tumor 2 to 6 cm Heart condition Weight 300 gms. Fatty degeneration atheroma of aorta

Autopsy No. 6 5 White age 47 Clinical diagnosis Pneumonia uremia Position of tumor One small submucous nodule. Size of tumor Small. Heart condition Weight, 50 gms. Cloudy swelling of myocardium Associated pathological findings Acut pneumonia chronic interstitial nephritis

Autopsy No 680 Black, age 50 Clinical diagnosis Hypertrophy and dilatation of heart myocarditis chronic valvular disease anasarca Position of tumor Three subperitoneal nodules Size of tumor ½ cm Heart condition Weight, 840 gms. Valvular disease, hypertrophy Associated pathological findings Chronic nephritis acute hemorrhagic pancreatitis

Autopsy No 707 Whit age 86 Clinical diagnosis Hemiplegia aortic disease arteriosclerosis Position of tumor Tw subserous. Size of tumor ½ and ½ cm Heart condition Weight, 600 gms Dilatation sclerosis of aortic mitral and tricuspid valves Associated pathological findings General arteriosclerosis.

Autopsy N 17 8 White, age 4 Clinical diagnosis General peritonitis pneumonia Position of tumor One subserous Size of tumor ½ in. Heart condition Weight, 320 gms. Cloudy swelling Associated pathological findings Acute pelvic peritonitis acute parenchymatous nephritis.

Autopsy N 744 Black, age 45. Clinical diagnosis Died two hours after admission coroner s case. Position f tumor One submucous nodule Size of tumor Marble Heart condition Weight, 580 gms Hypertrophy and dilatation Associated pathological findings Acut nephritis chronic diffuse nephritis arteriosclerosis cerebral hemorrhage.

Autopsy N 759 Black, age 38. Clinical diagnosis Endocarditis valvulitis chronic interstitial nephritis. Position of tumor Four subperitoneal nodules Size of tumor Small. Heart condition Weight, 480 gms. Mitral valvulitis hypertrophy and dilatation Associated pathological findings. General arteriosclerosis, chronic interstitial nephritis cancer of gall-bladder

Autopsy No. 1760. White age 43. Clinical diagnosis Cerebral hemorrhage. Position of tumor One subperitoneal nodule. Size of tumor 2 cm. Heart condition Weight, 380 gms. Hypertrophy and dilatation fatty degeneration. Associated pathological findings: Traumatic cerebral hemorrhage.

Autopsy No. 1800. Black, age 38. Clinical diagnosis Malignant tumor of bladder tuberculosis of lungs. Position of tumor One submucous. Size of tumor Small. Heart condition: Weight 300 gms. Cloudy swelling of myocardium. Associated pathological findings Œdema of lungs.

Autopsy No. 1830 Black, age 69. Clinical diagnosis Mitral and aortic disease tuberculosis of lungs. Position of tumor I terstitial. Size of tumor Small. Heart condition Weight, 310 gms. Mitral and aortic incompetence tricuspid stenosis chronic myocarditis. Associated pathological findings Chronic diffuse nephritis labor pneumonia.

Autopsy No. 1850. White, age 50. Clinical diagnosis Progressive pernicious anemia. Position of tumor One submucous Size of tumor ½ cm. Heart conditio Weight, 250 gms. Mitral and aortic sclerosis fatty degeneration. Associated pathological findings Atrophy of intestinal mucosa healed ulcer of colon fatty liver fatty degeneration of kidneys.

Autopsy N 899. Black, age 80. Clinical diagnosis (?) Position of tumor One interstitial. Size of tumor 8 x 6 cm Heart condition Weight, 50 gms Fibroid myocarditis fatty degeneration. Associated pathological findings Chronic interstitial nephritis hypernephroma right kidney acute miliary tuberculosis.

Autopsy N 919 White, age 55. Clinical diagnosis Uremia. Position of tumor One interstitial calcified Size of tumor ½ cm. Heart condition Weight, 500 gms. Fatty degeneration atheroma of aorta Associated pathological findings Chronic interstitial nephritis with superimposed acut process.

Autopsy No. 921 Black, age 8. Clinical diagnosis Valvular heart disease. Position of tumor Tw interstitial. Size of tumor 7 cm. Heart condition Weight, 300 gms. Early fibroid myocarditis atheroma of aorta. Associated pathological findings Chronic interstitial nephritis abscess of liver

Autopsy No. 937 White, age 6 Clinical diagnosis Atrophic cirrhosis of liver arteriosclerosis tuberculosis of lungs. Position of tumor Several interstitial. Size of tumor Small. Heart condition Weight, 260 gms. Fibroid myocarditis fatty degeneration Associated pathological findings Atrophic cirrhosis of liver chronic interstitial nephritis emphysema of lungs.

Autopsy No. 938. Black, age 59. Clinical diagnosis Fibroid of uterus. Position of tumor Large multiple. Size of tumor 6 to 1 cm. Heart

condition Weight 370 gms. Hypertrophy aortic and mitral stenosis. Associated pathological findings Chronic interstitial nephritis with superimposed acute process pneumonia not operated on because of kidney condition.

Autopsy No. 1951 White age 40. Clinical diagnosis Coroner's case. Position of tumor Numerous subserous and interstitial. Size of tumor Largest 4 cm. Heart condition Weight, 250 gms. Fatty degeneration dilated left ventricle. Associated pathological findings Glioma of brain.

Autopsy No. 1966. White, age 44. Clinical diagnosis Cancer of stomach mitral disease hypertrophy tuberculosis of lungs. Position of tumor: One submucous. Size of tumor 1 cm. Heart condition Weight, 220 gms. Mitral and aortic valvulitis. Associated pathological findings Chronic interstitial nephritis cancer of stomach.

Autopsy No. 1979 White, age 42 Clinical diagnosis Myocarditis acute nephritis. Position of tumor: One subserous sarcomatous degeneration. Size of tumor: cm. Heart condition. Weight, (?) Dilatation mitral sclerosis. Associated pathological findings Acute parenchymatous nephritis anasarca.

Autopsy No. 1980. White, age 31. Clinical diagnosis Dilatation of heart, acute encephalitis; chronic nephritis. Position of tumor One subserous. Size of tumor Almond. Heart condition Weight, 430 gms. Hypertrophy Associated pathological findings: Chronic interstitial nephritis early arteriosclerosis.

Autopsy No. 901 Black, age 45. Clinical diagnosis Cardiac dilatation and hypertrophy anasarca Position of tumor Two subserous. Size of tumor 15 cm Heart condition Weight, 550 gms. Dilatation and hypertrophy sclerosis of mitral valve Associated pathological findings Chronic parenchymatous nephritis

Autopsy No. 2022. White, age 63 Clinical diagnosis Hemiplegia. Position of tumor Two submucous Size of tumor 4 cm. Heart condition Weight 310 gms. Chronic interstitial myocarditis. Associated pathological findings chronic interstitial nephritis arteriosclerosis

Autopsy No 3058. White, age 68. Clinical diagnosis Tabes dorsalis chronic interstitial nephritis. Position of tumor One subperitoneal. Size of tumor (?) Heart condition Weight, 360 gms. Chronic interstitial myocarditis chronic endocarditis sclerosis of mitral and aortic valves. Associated pathological findings Chronic interstitial nephritis general sclerotic changes in all organs

Autopsy No. 18 Black, age 30 Clinical diagnosis Chronic myocarditis arteriosclerosis functional murmur tuberculosis of lungs chronic diffuse nephritis. Position of tumor One subperitoneal Size of tumor 7½ 5 cm. Heart condition Weight, 50 gms. Muscle flabby normal otherwise. Associated pathological findings Chronic parenchymatous nephritis congestion of lungs.

Autopsy No. 2115. Black, age 1 Clinical diagnosis: Puerperal sepsis. Position of tumor Few subperitoneal. Size of tumor: Pea to marble. Heart condition: Weight, 260 gms. Cloudy swelling of myocardium; subendocardial hemorrhage Associated pathological findings. Pelvic peritonitis

Autopsy No. 2 32 Black, age 51 Clinical diagnosis. Ovarian cyst ascites myocarditis. Position of tumor Four subperitoneal. Size of tumor Largest 3 cm. Heart condition: Weight, 600 gms. Hypertrophy; dilatation chronic mitral and tricuspid valvulitis. Associated pathological findings Cirrhosis of liver ovarian cyst acute pyosalpinx passive congestion of kidneys.

Autopsy No. 2 60. Black, age 65 Clinical diagnosis Chronic nephritis, mitral and aortic disease Position of tumor One interstitial. Size of tumor ¾ cm. Heart condition Weight, 470 gms. Hypertrophy and dilatation chronic mitral and aortic disease chronic endocarditis. Associated pathological findings chronic diffuse nephritis.

Autopsy No. 2183. White, age 55 Clinical diagnosis. Aortic disease arteriosclerosis tubercular peritonitis. Position of tumor Multiple small nodules calcareous. Size of tumor Largest 3½ cm. Heart condition Weight 450 gms. Hypertrophy of left ventricle dilated left auricle chronic mitral valvulitis. Associated pathological findings. General arteriosclerosis tubercular peritonitis.

Autopsy No. 186. Black, age 46. Clinical diagnosis. Uremia, mitral disease chronic diffuse nephritis. Position of tumor Cystic fibroid. Size of tumor Weight 15 gms. Heart condition 425 gms. Hypertrophy calcified mitral valve atheroma of aorta Associated pathological findings. Chronic interstitial and parenchymatous nephritis cerebral hemorrhage.

Autopsy No. 20. White, age 44 Clinical diagnosis Pneumonia Position of tumor Multiple. Size of tumor Largest 4 cm. Heart condition: Weight, (?) Fat infiltration and cloudy swelling of myocardium sclerosis of mitral and aortic valves. Associated pathological findings General arteriosclerosis

Autopsy No 2 38. Black, age 38. Clinical diagnosis Anasarca, nephritis oedema of lungs. Position of tumor Two subserous nodules. Size of tumor Small. Heart condition Weight, (?) Hypertrophy and dilatation chronic endocarditis. Associated pathological findings Chronic interstitial nephritis

Autopsy No 326 White age 6 Clinical diagnosis Sarcoma of liver Position of tumor Subperitoneal Size of tumor 5 cm. Heart condition Weight, 260 gms Muscle pale and soft, chronic mitral valvulitis. Associated pathological findings Primary cancer of gall bladder gall stones small white kidneys.

Autopsy No 334 White, age 66 Clinical diagnosis Hemiplegia, pneumonia myocarditis Position of tumor Many small interstitial. Size of tumor Small. Heart condition Weight, 333

gms. Acute pericarditis sclerosis of mitral and aortic valves coronary vessels. Associated pathological findings Chronic interstitial nephritis cranium not opened.

Autopsy No 2346. White, age 60. Clinical diagnosis Hemiplegia myocarditis chronic valvulitis Position of tumor One subperitoneal. Size of tumor 1 cm. Heart condition Weight, 565 gms. Hypertrophy and dilatation sclerosis of mitral valve. Associated pathological findings Chronic interstitial nephritis.

Autopsy No. 2349 White, age 67 Clinical diagnosis Hemiplegia valvulitis, dilatation pneumonia. Position of tumor One subperitoneal polyp. Size of tumor ½ in. Heart condition Weight, 4 5 gms. Hypertrophy brown atrophy Associated pathological findings Chronic interstitial nephritis.

Autopsy No. 2350. White, age 67 Clinical diagnosis Paralysis agitans. Position of tumor Many subperitoneal nodules. Size of tumor Small. Heart condition Weight, 3 5 gms. Muscle normal atheroma of all valves. Associated pathological findings General arteriosclerosis.

Autopsy No 2374. White, age 56 Clinical diagnosis Diplegia Position of tumor Many subperitoneal nodules Size of tumor Pea t walnut. Heart condition Weight, 300 gms. Normal.

A topsy No. 2390. White, age 78. Clinical diagnosis Pneumonia arthritis deformans. Position of tumor One submucous calcified. Size of tumor 4 cm Heart condition Weight, 400 gms. Sclerosis of valves.

Autopsy N 2394 Black, age 29 Clinical diagnosis Mitral and aortic disease nephritis. Position of tumor Two interstitial Size of tumors Pea Heart condition Weight, 500 gms. Hypertrophy and dilatation fatty degeneration of muscle, chronic mitral and ortic valvulitis. Associated pathological findings Cyanotic induration of kidney

Autopsy N 2399 White, age 63 Clinical diagnosis Pneumonia Position of tumo Several subperitoneal. Size of tumor t 4 cm Heart condition Weight 265 gms Cloudy swelling of myocardium sclerosis of mitral and aortic valves Associated pathological findings Chronic interstitial nephritis.

Autopsy N 4 Whit age 65. Clinical diagnosis Cerebral thromboses Positio of tumor Several interstitial calcified Size f tumor Pea to marble Heart condition Weight, 350 gms Fatty degeneration sclerosis of mitral and aortic valves Associated pathological findings Syphilitic arteriosclerosis

Autopsy No. 24 8. Black age 4 Clinical diagnosis Paresis Position f tumor One subperitoneal. Size of tumor cm Heart condition Weight, 260 gms Normal

A topsy No. 2404 Black, age 50 Clinical diagnosis Myocarditis Position of tumor Two subperitoneal. Size of tumor cm. Heart condition Weight, 300 gms. Fatty with moderate fibrosis dilatation of left ventricle chronic mitral and aortic valvulitis. Associated pathological findings Chronic interstitial nephritis.

Autopsy No. 25 7 Black, age 45 Clinical diagnosis Uterine fibroid acute dilatation of heart diffuse nephritis sent to hospital as case of eclampsia. Position of tumor Multiple tumors. Size of tumor Large. Heart condition Weight, 510 gms. Chronic interstitial myocarditis dilatatio left ventricle chronic aortitis. Associated pathological findings Chronic interstitial nephritis oedema of both lungs. Died day of admission to hospital of uræmia. No operation.

Autopsy No. 549 Black, age 26. Clinical diagnosis Parenchymatous nephritis myocarditis acute dilatation anasarca. Position of tumor One submucous. Size of tumor 3 cm. Heart condition Weight, 440 gms. Dilated right auricle. Associated pathological findings Atrophic cirrhosis of liver chronic interstitial nephritis general oedema

Autopsy No. 557 White, age 84. Clinical diagnosis Cancer of stomach. Position of tumor Four interstitial uterus atrophied. Size of tumor 2½ cm. Heart condition Weight, 75 gms. Brown atrophy, general sclerotic changes. Associated pathological findings General arteriosclerosis no cancer.

Autopsy No 581 White age 65 Clinical diagnosis Acute myocarditis. Position of tumor One interstitial nodule. Size of tumor Small. Heart condition Weight, 745 gms. Hypertrophy and dilatation. Associated pathological findings Chronic interstitial nephritis atrophic cirrhosis of liver gall-stones.

Autopsy No. 2590. Black, age 40. Clinical diagnosis Myocarditis aortic disease diffuse nephritis. Position of tumor Multiple. Size of tumor (?) Heart condition Weight, 475 gms. Acute endocarditis superimposed on chronic process atheroma of aorta. Associated pathological findings Diffuse nephritis.

Autopsy No. 59 Black, age 63. Clinical diagnosis Hemiplegia uræmia diffuse nephritis myocarditis arteriosclerosis Position of tumor Several interstitial calcified. Size of tumor 3 cm. Heart condition Weight, 455 gms. Chronic adhesive pericarditis hypertrophy and dilatation mitral stenosis aortic endocarditis Associated pathological findings Chronic diffuse nephritis gall-stones.

Autopsy No. 594. White, age 32. Clinical diagnosis General carcinomatosis Position of tumor One subperitoneal. Size of tumor Small. Heart condition Weight, 185 gms. Smaller than normal sclerosis of coronaries chronic pericarditis, sclerotic mitral and aortic valves. Associated pathological findings General carcinomatosis chronic interstitial nephritis

Autopsy No. 597 Black, age 55. Clinical diagnosis Cardiac hypertrophy with dilatation. Position f tumor One interstitial. Size of tumor

2 cm. Heart condition: Weight, (?) gms. Hypertrophy right auricle dilated sclerosis of aortic and mitral valves. Associated pathological findings: Atrophic cirrhosis of liver chronic interstitial nephritis.

Autopsy No. 26 9. White, age (?) Clinical diagnosis Uræmia hypertrophy of heart. Position of tumor One interstitial. Size of tumor 2 cm. Heart condition: Weight, 360 gms. Muscle pale, not firm; hypertrophy and dilatation of left ventricle. Associated pathological findings Chronic diffuse nephritis.

Autopsy No. 26 7 Black, age 50. Clinical diagnosis Hemiplegia arteriosclerosis. Position of tumor One subperitoneal. Size of tumor: Fist. Heart condition Weight, 345 gms. Hypertrophy sclerotic aortic and mitral valves. Associated pathological findings Chronic interstitial nephritis cerebral hemorrhage general arteriosclerosis.

Autopsy No. 2660. White, age 50. Clinical diagnosis Cardiac hypertrophy and dilatation mitral regurgitation. Position of tumor Few interstitial. Size of tumor Small. Heart condition Weight, 580 gms. Hypertrophy and dilatation; pale muscle.

Autopsy No. 2674. Black, age 44. Clinical diagnosis: Valvular heart disease chronic nephritis anasarca. Position of tumor several interstitial and subareolar Size of tumor small. Heart condition: Weight, (?) gms Hypertrophy and dilatation sclerotic valves and coronary arteries. Associated pathological findings Arteriosclerosis, nutmeg liver cyanotic induration of kidneys.

Autopsy No 2681. White, age 38. Clinical diagnosis Hemiplegia status epilepticus. Position of tumor Few interstitial. Size of tumor Very small. Heart condition Weight, (?) gms Chronic myocarditis sclerotic aortic and mitral valves. Associated pathological findings Chronic interstitial nephritis syphilitic liver

Autopsy No. 2691 White age 57 Clinical diagnosis Pneumonia myocarditis. Position of tumor: One interstitial. Size of tumor Small Heart condition Weight, 356 gms. Normal sclerosis of aorta. Associated pathological findings Pneumonia chronic interstitial nephritis.

Autopsy No 2697 Black, age 55 Clinical diagnosis Sarcoma of femur myocardial degeneration. Position of tumor One subperitoneal, calcified. Size of tumor Very large Heart condition Weight, 375 gms Small and firm small sarcomatous nodule. Associated pathological findings Sarcoma of femur

Autopsy No. 2699 White, age 79. Clinical diagnosis Apoplexy, pneumonia arteriosclerosis. Position of tumor One subperitoneal polyp. Size of tumor 3 5 cm. Heart condition Weight, 360 gms. Chronic interstitial myocarditis sclerosis of mitral and aortic valves and coronary arteries. Associated pathological findings General arteriosclerosis chronic interstitial nephritis cerebral oedema.

Autopsy No. 2749. White, age 61. Clinical diagnosis Pneumonia meningitis valvular disease of heart. Position of tumor: One subperitoneal, calcified. Size of tumor Baseball. Heart condition: Weight, 340 gms. Dilatation chronic mitral and aortic sclerosis calcareous coronaries. Associated pathological findings general arteriosclerosis.

Autopsy No. 753 Black, age 58. Clinical diagnosis Cerebral thrombosis arteriosclerosis. Position of tumor Several submucous. Size of tumor: Small. Heart condition Weight, 300 gms. Slight chronic myocarditis. Associated pathological findings Chronic parenchymatous nephritis old cerebral hemorrhage.

Autopsy No. 2760. Black, age 6 Clinical diagnosis. Meningo-myelitis Position of tumor One interstitial. Size of tumor Small. Heart condition Weight, 205 gms. Sclerosis of valves and coronary arteries syphilitic aortitis Associated pathological findings. Chronic interstitial nephritis

Autopsy No. 2766 Black, age 50. Clinical diagnosis. Tubercular meningitis. Position of tumor Few Size of tumor Small. Heart condition Weight, 450 gms. Cloudy swelling mitral sclerosis. Associated pathological findings General arteriosclerosis chronic interstitial nephritis diffuse meningeal hemorrhage

Autopsy No. 768. White, age 53. Clinical diagnosis Diabetes mellitus. Position of tumor One submucous. Size of tumor Lemon. Heart condition Weight, 310 gms. Brown atrophy, chronic myocarditis slight mitral, aortic and coronary sclerosis Associated pathological findings (?)

Autopsy No 773. Black, age 53 Clinical diagnosis Tuberculosis of lungs, pelvic tumor. Position of tumor Multiple calcified. Size of tumor Largest, 7 0 cm. Heart condition: Weight, 370 gms. Chronic myocarditis, fatty myocardium sclerosis of mitral and aortic valves, and aorta and coronaries Associated pathological findings Œdema of lungs chronic interstitial nephritis.

Autopsy No 780 Black, age 30. Clinical diagnosis Hæmophilia valvulitis. Position of tumor Few interstitial nodules. Size of tumor Small. Heart condition Weight, 350 gms. Chronic fibroid myocarditis Associated pathological findings Hypernephroma of left kidney

Autopsy No 78 White, age 52 Clinical diagnosis. Cancer of liver tuberculosis of lungs. Position of tumor One subperitoneal Size of tumor cm Heart condition Weight, 20 gms. Fatty degeneration. Associated pathological findings Healed tuberculosis of lungs cancer of gall-bladder

Autopsy No 78 8 Black, age 53 Clinical diagnosis Cardiac dilatation myocarditis. Position of tumor Multiple. Size of tumor Largest, 20 7 cm. Heart condition Weight, 30 gms. Valves normal slight sclerosis of coronaries myo-

cardium pale and flabby Associated pathological findings Mixed tumor of carotid with metastases to liver chronic passive congestion of kidneys.

Autopsy No. 2826. White, age 49. Clinical diagnosis Mitral and tricuspid regurgitation. Position of tumor Two nodules Size of tumor: Pea and acorn. Heart condition Weight, 460 gms. Chronic pericarditis hypertrophy chronic mitral and aortic sclerosis. Associated pathological findings Chronic parenchymatous nephritis.

Autopsy No. 2856. White, age 74. Clinical diagnosis Myocardial degeneration, arteriosclerosis. Position of tumor Two subperitoneal. Size of tumor Small. Heart condition Weight, 4 0 gms. Dilatation of right heart. Associated pathological findings General arteriosclerosis.

Autopsy No. 2858 White, age 67 Clinical diagnosis Senile dementia pneumonia. Position of tumor One nodule. Size of tumor 3 cm. Heart condition Weight 360 gms. Cloudy swelling. Associated pathological findings General arteriosclerosis.

Autopsy No. 860. Black, age 38. Clinical diagnosis Myocarditis mitral regurgitation chronic parenchymatous nephritis. Position of tumor Two subperitoneal calcified Size of tumor 8 cm. Heart condition Weight, 500 gms Hypertrophy and dilatation chronic aortic endocarditis. Associated pathological findings Cirrhosis of liver chronic parenchymatous nephritis

Autopsy No. 869 White ge 48 Clinical diagnosis Status epilepticus Position of tumor One submucous polyp. Size of tumor 3½ cm. Heart condition Weight, 480 gms. Chronic endocarditis hypertrophy atheroma of orta. Associated pathological findings Chronic diffuse nephritis tuberculosis of lungs.

TABLE II

SHOWING ASSOCIATED HEART LESIONS FOUND ON POST-MORTEM EXAMINATION

	Fibroids, 100 cases	Other Conditions, 100 cases
Normal hearts		18
Sclerotic mitral valves	57	44
Sclerotic aortic valves	43	43
Sclerotic tricuspid valves	9	3
Sclerotic pulmonic valves		
Chronic pericarditis	8	
Chronic myocarditis	5	14
Chronic endocarditis		
Epicardial plaques	5	6
Sclerosis of coronaries	14	7
Atheroma of aorta		9
Hypertrophy	34	59
Dilatation	9	5
Fatty heart	14	18
Brown atrophy	7	3
Cloudy swelling		
Aneurism		5
Atrophy		
Acute endocarditis		
Acute pericarditis		4
Acute aortic disease		
Acute mitral disease		
Acute tricuspid disease		1
Hydropericardium	6	
Hæmopericardium.		1
Pericardial ecchymosis	1	
Subendocardial hæmorrhage		
Œdema of the myocardium		
Myxoma of the heart	1	
Lipomatosis pericardii		3
Total lesions	241	332

TABLE III

(Age from twenty to twenty-nine years)

	Fibroids, 9 cases	Other Conditions
Normal		
Acute endocarditis		1
Sclerosis of coronaries		1
Total lesions	1	

Multiple acute gangrene of lung

TABLE IV

(Age, from thirty to thirty-nine years)

	Fibroids, 31 cases	Other Conditions
Normal	5	8
Hypertrophy	4	1
Dilatation	8	
Chronic mitral disease	5	
Chronic aortic disease		
Sclerosis of coronaries		
Hydropericardium	2	
Sclerosis of tricuspid		
Pericardial ecchymosis		
Chronic pericarditis		
Acute pericarditis		
Chronic myocarditis		
Epicardial plaques		
Chronic endocarditis		
Fatty heart	1	
Atrophy of heart		
Atheroma of aorta.		1
Total lesions.	28	8

Cerebral tumor, pyosalpinx, tuberculous meningitis, miliary tubercolosis, gall-stones, pulmonary tuberculosis, stomach cancer of breast, syphilis, cancer of rectum, gastric ulcer, pneumonia.

TABLE V

(Age from forty to forty-nine years)

	Fibroids, 15 cases	Other Conditions
Normal	7	5
Dilatation	3	4
Hypertrophy	7	5
Chronic aortic disease		8
Chronic mitral disease		
Fatty heart	9	3
Epicardial plaques	3	3
Chronic myocarditis		
Chronic pericarditis	4	3
Chronic endocarditis		
Sclerosis of coronaries		
Cloudy swelling		
Aneurism		
Hydropericardium		
Small heart		
Atheroma of aorta		4

Acute aortic disease		1
Acute tricuspid disease		1
Brown atrophy		1
Acute pericarditis		1
Hemopericardium		1
Total lesions	45	53

Cancer of pancreas, chronic parenchymatous nephritis, pulmonary tuberculosis, acute nephritis, mastitis, aortic valvular disease, pneumonia, miliary tuberculosis, aortic aneurism, pelvic peritonitis, diabetes, acute pericarditis, pachymeningitis, purpura, tubo-ovarian, cancer of uterus, erysipelas

TABLE VI

(Age, from fifty to fifty-nine years)

	Fibroids, 17 cases	Other Conditions
Normal		
Hypertrophy	1	8
Dilatation		
Chronic mitral disease	7	9
Chronic aortic disease	14	
Chronic tricuspid disease		
Sclerosis of coronaries	4	
Epicardial plaques		3
Chronic pulmonic disease		
Hydropericardium.		
Fatty heart	4	6
Brown atrophy		
Myxoma of heart		
Atheroma of aorta		4
Chronic pericarditis	3	
Chronic myocarditis	3	5
Edema of myocardium		
Acute pericarditis		
Aneurism		
Total lesions	66	67

Pernicious anemia, hemorrhages in chronic interstitial nephritis, pneumonia, myositis in adipose dystrophy, tubo-ovarian, aneurism, pulmonary tuberculosis, mastitis, perimyocarditis, epithelial cancer of vagina, valvular heart disease, appendicitis, hepatic cholangeitis.

TABLE VII

(Age, from sixty to sixty-nine years)

	Fibroids, 17 cases	Other Conditions
Normal		
Hypertrophy	6	6
Dilatation	3	3
Fatty heart	5	4
Chronic mitral disease	3	3
Chronic aortic disease	6	3
Chronic tricuspid disease	4	
Sclerosis of coronaries		3
Atheroma of aorta		5
Chronic myocarditis		3
Hydropericardium		
Chronic pericarditis	1	
Brown atrophy	3	
Cloudy swelling		
Epicardial plaques		
Chronic endocarditis		
Liponatosis pericardii		3
Acute mitral disease		
Acute aortic disease		
Total lesions	49	61

Chronic interstitial nephritis, fractured thigh, cancer of vagina, carcinomatosis of breast, cancer of stomach, pneumonia, apoplexy, gallstones, senile dementia, thrombosis, valvular heart disease, abscess of kidney

TABLE VIII

(Age from seventy to seventy-nine years)

	Fibroids, 14 cases	Other Conditions
Hypertrophy	7	7
Dilatation		
Chronic mitral disease		8
Chronic aortic disease		10
Chronic tricuspid disease		
Chronic pulmonic disease		
Sclerosis of coronaries	3	
Acute aortic disease		
Epicardial plaques		
Chronic myocarditis	4	1
Chronic pericarditis		
Fatty heart	1	4
Brown atrophy		
Hydropericardium.	1	
Atheroma of aorta		4
Aneurism of aorta		
Subendocardial hemorrhage		
Total lesions	48	39

Pneumonia, chronic parenchymatous nephritis, cancer of stomach, gallstones, pulmonary tuberculosis, sclerosis, aneurism of aorta, abscess of kidney, chronic interstitial nephritis.

TABLE IX

(Age, eighty years and over)

	Fibroids, cases	Pneumonia
Chronic aortic disease		
Sclerosis of coronaries		
Chronic tricuspid disease		
Atheroma of aorta		
Total lesions	—	1

TABLE X

(Age, twenty to thirty-nine years)

	Fibroids, 28 cases	Other Conditions
Normal	9	10
Hypertrophy	8	
Dilatation	4	
Chronic mitral disease	9	4
Chronic aortic disease	6	4
Sclerosis of coronaries	6	
Sclerosis of tricuspid	1	
Hydropericardium	1	
Pericardial ecchymoses		
Chronic pericarditis		
Acute pericarditis		
Chronic myocarditis	6	
Epicardial plaques	4	8
Chronic endocarditis	1	
Fatty heart		
Atrophy of heart		5
Atheroma of aorta		
Cloudy swelling		
Subendocardial hemorrhage		
Liponatosis pericardii		
Acute endocarditis		
Total lesions	61	32

Miliary tuberculosis gall-stones, cancer of breast, cancer of stomach, puerperal ulcer, cerebral tumor, tuberculous meningitis, sarcoma, GYN, pulmonary tuberculosis, cancer of liver, epilepsy, stenosis, pneumonia, puerperal multiple nerve tic, pregnancy of long gestation, multiple nerve tic, pregnancy of long

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A STUDY OF THE COMPARATIVE VALUE OF FUNCTIONAL TESTS IN THE SURGICAL DISEASES OF THE KIDNEY SECONDARY TO OBSTRUCTION IN THE LOWER URINARY TRACT

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IN our previous communications[1] on the subject of renal function attention has been called to the value of phthalein in affording an index to the renal functional capacity in the changes resulting from obstruction in the lower urinary tract. It was pointed out that such patients are frequently the subject of hydronephrosis, pyelonephritis, pyonephrosis, pressure atrophy and resulting changes in functional activity and that the urine output, urea and total solids might be practically normal and yet the patient be on the verge of renal failure which would surely be precipitated by any radical surgical interference. The phthalein was shown to be of value in all these cases and to allow of differentiation between those cases with severe renal damage and those in which the renal involvement was slight. It was further shown that the marked improvement of the renal condition and operative risk which followed the adoption of Young's preliminary treatment (constant catheter and forcing of water) was the result to a large extent of the improvement of the renal functional capacity. It was claimed that the test made it possible to determine the cases suitable or unsuitable for operation and also to determine in any given case the most propitious time for surgical intervention.

In this study a number of tests have been utilized in order to determine if any individual test or any combination of tests furnishes information other than that derived from the use of phthalein. The number of functional tests has increased to such an extent that it is essential to determine which can be discarded without loss. Only through familiarity with the reliability, value, limitations, peculiarities, and the significance of the findings of each test in the various types of disease is the most profitable selection of tests made possible.

Renal functional capacity is usually ascertained in one of two ways: (1) Tests of excretory capacity through the quantitative determinations of the secretion of various substances in the urine — dyes, methylene blue, indigo carmin, rosaniline and phthalein, other chemicals, potassium iodide, lactose, salicylates, sodium chloride, urea, sugar following phloridzin, and the enzyme diastase. (2) Tests of retention through the determination of the concentration of certain substances in the blood, ions — through electrical conductivity, molecules and ions — through cryoscopy, and urea, total incoagulable nitrogen and cholesterin. Choice has been made of what has appeared to be the most important representatives of these groups, viz., of the first, phthalein, lactose, diastase and urea; of the second, cryoscopy and blood urea.

THE TESTS EMPLOYED AND THEIR TECHNIQUE

1. The *phthalein* was used according to the usual technique.

2. *Lactose* was employed according to Schlayer's technique[2]: 2.5 gms. of lactose are dissolved in 25 ccm. of freshly distilled water, placed in a 50 ccm. Erlenmeyer flask, stoppered with cotton. This is pasteurized for 4 hours on four successive days between 75–80° C., and is injected intravenously, the number of hours necessary for excretion being determined. Nylander's and Fehling's tests were used to demonstrate the presence or absence of sugar. No quantitative polarimetric determinations, which are advised by Schlayer, were utilized, since only in a small proportion of cases did glycosuria occur.

3. *Diastase*. Diastase was introduced into functional renal work by Wohlgemuth[3] for

[1] Rowntree and Geraghty, J. Pharm. & Exp. Therap., 1909, i, 79; Arch. Internal Med., 1910, vi, 274.

[2] Schlayer and Tokayama, Deutsche Arch. f. klin. Med., 1910, xcix, 397.

[3] Wohlgemuth, Zeitschr. f. Urol., 1910, iv, 801.

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determining the relative functional capacity of the two kidneys. A modification of this method was devised by us to make the test adaptable for determining total renal functional capacity. The technique which we employed was elaborated in conjunction with Dr. Thomas R. Brown,[1] who has demonstrated with it that the total daily output in urine is fairly constant. The technique employed was as follows: One-fifth of the twenty four hour urine collected under toluol was neutralized and diluted to 1 L. By means of a graduated 2 ccm. pipette, decreasing amounts of urine were placed in a series of twelve tubes (arranged in a rack) as follows: 1.8, 1.6, 1.4, 1.2, 1, 0.8, 0.6, 0.4 ccm. Ten ccm. of the diluted urine was further diluted to 20 ccm. and of this decreasing amounts placed in the remaining tubes of the series as follows: 0.4, 0.2, 0.1, 0.05 ccm. To each tube was added sufficient 1 per cent NaCl solution to bring the total volume in each tube to 2 ccm. Two ccm. of a 0.1 per cent freshly prepared soluble starch solution was added to each tube. The rack with the tubes was placed in a water bath at 38° C. for a half hour, then transferred to cold water for 3 minutes. Sufficient 1/50 N iodine solution was added drop by drop in amounts sufficient to elicit a permanent color. The occurrence of blue or violet shows incomplete digestion, while the last tube without the violet color indicates the diastatic activity of the urine and from it is calculated. The diastatic activity is expressed by $d\frac{5}{30}$ which represents the number of ccm. of 0.1 per cent starch solution capable of being digested at 38° C. in 30 minutes by 1 ccm. of the urine as originally diluted.

The urea content of the twenty-four hour specimens of urine was determined by the Doremus and the Marshall methods, the results of each being given.

The principle of Marshall's method consists in the conversion of the urea into ammonium carbonate by means of an enzyme, urease, present in an extract of the soy bean, and the titration with standard hydrochloric acid and methyl orange. Two 5 ccm. portions of urine are measured into flasks of 200–300 ccm. capacity and diluted with distilled water to about 100–125 ccm. Two ccm. of the enzyme solution are added to one flask, a few drops of toluol to each, and the solutions allowed to remain, well stoppered, at room temperature over night. The fluid in each flask is titrated with 0.1 NHCl and methyl orange. The amount of hydrochloric acid required for neutralization of the contents of the flask containing the urine and enzyme solution less the amount required for neutralization of 5 ccm. urine alone and 2 ccm. enzyme solution alone corresponds to the urea originally present in the urine. This value multiplied by 0.6 gives the number of grams of urea per liter of urine.

The freezing point of serum was made in the ordinary way, utilizing the Beckmann apparatus, 25 to 50 ccm. of blood usually being taken from the patient.

The blood urea was determined according to Marshall's method[2] which is as follows: Two equal portions of the serum (3 ccm. or 5 ccm.) are measured into two small test tubes, 1 ccm. of the enzyme solution added to one, toluol to each, and the tubes allowed to remain over night. The contents of each tube are washed into tall cylinders, alcohol and sodium carbonate added, and the ammonia removed by means of a strong air current. The ammonia is collected in flasks containing 25 ccm. N/50 hydrochloric acid. When all the ammonia has been driven over, the excess of acid in the flasks is titrated with N/50 sodium hydroxide and sodium alizarin sulphonate. The amount of hydrochloric acid required to neutralize the ammonia from the serum and enzyme solution less the amount required for the ammonia from the serum alone represents the urea present in the amount of serum taken.

THE RESULTS OBTAINED

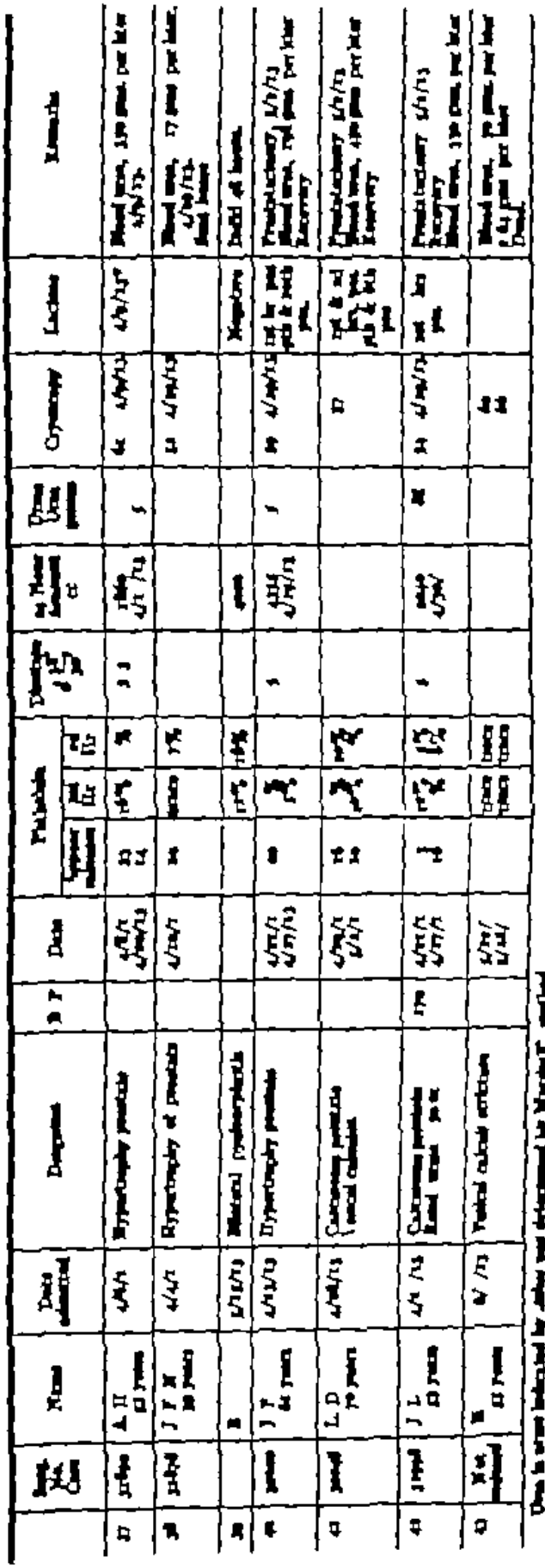
In the following table are presented data relating to 43 cases in the majority of which a combination of all of the tests mentioned has been utilized. The cases for the most part exhibited varying degrees of urinary obstruction.

Our earlier views in regard to the value of the phthalein test in this type of case require

[1] [illegible]
Marshall: J. Biol. Chem., 1911, xv, 483.

[2] [illegible]

	[illegible]	D M D 69 years	/1/13 1/8/13	Double polycystic kidneys	high	/1/1	20	trace	trace	1/8/ 3	ridge	18 3	70 /1/13			Died suddenly few weeks later No autopsy
29	31549	J S 33 years	/1/1	Hypertrophy prostate		/1/13		14%	14%				58 /8/13			Prostatectomy Recovery
30	13123	L F 73 years	1/ 1/13	Hypertrophy prostate Bad heart condition		/11/1 /11/13	16 20	17% 7%	14% 5%				56 1/16/13			Prostatectomy Recovery
31	09432	L R 48 years	1/18/13	Bilateral hydronephrosis Conscious bed		/ 8/13	26	trace	trace				61 1/20/13			No operation
32	31309	J T C 74 years	1/1/13	Hypertrophy prostate		1/1/13		7%	%				58 /1/13			Prostatectomy Recovery
33	3117	S B R 42 years	1/20/13	Contraction vesical neck		/20/13	20	14%	%		1/20/13 glo	5	54 1/14/13			Punch Recovery
34	3 133	Col F M 72 years	1/20/13	Cancer prostate Paralysis, Hydrocephalus		/20/ 3 1/28/13	23	30% 42%	19% 17%	/28/1 3	glo 1/17/	7	54 1/26/ 3			Prostatectomy 1/7/ 3 Recovery
35	31390	Wm L 63 years	1/25/13	Hypertrophy prostate						20	cyclo	19 3 5	54 1/26/ 3			Prostatectomy 1/28/13 Recovery
36	31146	Gen. J S 71 years	/19/13	Chr cystitis Contracted bladder	140	/13/13 3/8/	6 20	20% 36%	15% 13%	1/28/13 3	120 /17/	19 3 3 9				If operation.
37	31383	L V M 69 years	1/26 13	Hypertrophy prostate Acute double pyelone plastic		2/2/ 3	20	11%	19%	2/2/13 3	130 2/1/13	3 3 3 7	60 2/ /13			Prostatectomy 2/2/13 Blood urea, 260 gms per liter Died
38	31600	Col C W 73 years	2/1/13	Hypertrophy prostate		2/ / 3 2/4/13 2/8/1	19	30 30% 36%	15% 18% 18%	2/2/13	cyclo 2/2/13	42 3 28 4	50 2/2/ 3			Prostatectomy 2/7/13. Recovery
39	31619	Dr A H L 71 years	2/1/13	Cancer prostate		2/2/ 3	13	17%	20%				53 2/4/13			Prostatectomy 2/2/13 Blood urea, 140 gms per liter. Recovery
40	31677	R C B 69 years	2/1/13	Hypertrophy prostate Haemophilia for dressings 2/14/13	140	2/2/ 3 2/8/ 3 2/10/13	22 22	2% 14% 17%	10% 8%	2/ /13 3 2/18/13	180 2/ 1/ 3 cyclo 2/28/13 good 2/20/ 3	6 6 22 20	54 2/10/13			
41	31670	O M 66 years	2/7/13	Cancer prostate	140	2/8/13	14	48%	17%	2/ 2/13 3	133 2/13/13	13 9	60 2/11/13			Prostatectomy operation Blood urea, 70 gms per liter Recovery
42	1794	R F 71 years	2/1 /13	Cancer prostate		2/9/ 3	11	33%	17%	2/ 9/1 3	1330 2/18/ 3	3 3	60 2/10/ 3			Prostatectomy 4/2/ Blood urea 111 gms per liter. Recovery
43	31762	W H D 48 years	2/12/13	Haematoma		2/22/ 3 2/23/13 2/26/13	19 10 K	26% 43% um mm	15% R L 15	7	140 2/22/ 3	6 4 9	59 2/ 2/ 3	Negative 2/23/1		No operation. Blood urea, 250 gms per liter
44	31864	C K 63 years	2/26/13	Hypertrophy prostate		2/20/13		trace	trace	8 3	173 4/2/ 3	5 4	61 59 4/2/ 3	Negative 4/2/ 3		Prostatectomy
45	09329	J T	2/23/1	Cancer prostate	55	/26/12	9	15%	18%					8 hours		
46	31779	G H 55 years	2/22/13	Double polycystic kidney	90	2/28/13	20	20%	16%	7	160 4/ /13 dose 4/9/13	6 4 4				Went home.



no revision. As an index of the total renal function it has proven uniformly accurate and reliable.

The lactose test has been employed in 22 cases. In all of the earlier cases the urine was collected for 4 hours and each 2 hours thereafter up to 12 hours following Schlayer's technique. In only two cases Nos. 8 and 35 was a positive test for sugar obtained. In No 6 a case of tabes, with 200 ccm. residual urine the phthalein showed practically a normal renal function, while clinical findings showed no evidence of renal disease However no lactose was obtained in this case In Case 10, with hypertrophied prostate and normal renal function as indicated by phthalein no lactose was excreted This patient was in good clinical condition and successful prostatectomy was performed In four later cases in which following the lactose injection the urine was collected at hourly intervals, a trace of lactose was obtained in some of the periods. The renal function in these cases was more impaired than in many of the earlier ones in which the first collection was for 4 hours. It is not improbable that if the urine had been collected at hourly intervals in these earlier cases, a positive test might have been obtained in some of the hourly specimens in many of the cases which showed a negative finding with the technique employed. In two of the four cases mentioned above the excretion was complete within 4 hours. One of these however had a severe grade of renal involvement.

The majority of the patients in this group were on forced water and excreted large quantities of urine Marked dilution resulting from this polyuria may help to explain the failure to detect lactose where traces only were excreted The failure on the part of lactose to appear in the urine is in keeping with our earlier experiences with phloridzin in this type of renal disease Phloridzin was used in eight patients suffering from renal changes secondary to prostate hypertrophy but in not a single instance was sugar recovered. Further observations were therefore not made.

The lactose test in this type of case has proven of but little value from a diagnostic

standpoint, and of no value in relation to prognosis.

Twenty-seven diastase estimations were made in 24 cases. We have considered the normal diastatic activity of the diluted urine as $d\frac{5}{60}=5.0$

In some cases with severe renal damage, the diastase content was normal. A striking example of this is Case 5 in which the phthalein and the clinical condition indicated severe renal impairment. The diastase value was $d\frac{10}{60}=10$ This patient died of hemorrhage following prostatectomy and at autopsy a well marked chronic diffuse nephritis with chronic bilateral pyelonephritis and a moderate grade of hydronephrosis was discovered. One kidney was one-fourth the size of the other the larger kidney weighing 170 grams The character of the lesions was similar in both kidneys. On the other hand in another case Case 18 in slight hematuria with advanced double polycystic disease of the kidneys, with a blood pressure of over 200 mm a trace of phthalein in two hours and a freezing point of $-.70^{\circ}$ the diastase was only slightly reduced being $d\frac{3.3}{60}=3.3$ This patient died a few weeks after leaving the hospital, without the cause of death being ascertained

In Case 33 in which the phthalein and clinical findings showed only slight renal impairment, the diastase was markedly decreased $d\frac{1.7}{60}=1.7$

In the majority of instances of disease a decreased diastatic activity is present, but no constant or definite relationship between the diastatic activity and the true renal function as shown by phthalein and clinical findings exists Where, however a complete absence of diastase in the urine occurs, it apparently indicates a bad prognosis Two cases, Nos. 7 and 43 with severe renal impairment as shown by excretory tests and the presence of marked cumulative phenomena, showed no diastase and death occurred within two weeks in Case 43 and within one month in the other Autopsies were obtained in each of these cases and revealed advanced renal disease

Urea estimations of the twenty four hour output were made in twenty two cases. These give information of but little value Patients with very low renal function and advanced disease frequently excrete larger amounts than those in good clinical condition and with comparatively good renal function. When however there is a persistently very low urea elimination it indicates a severe grade of renal disturbance.

In utilizing the second group of tests viz tests of retention, a consideration of what is to be accepted as the normal limit seems advisable Although Folin and Denis accept 0 28 gm. urea per liter as the normal where no dietary control is exercised in health or in many diseases without recognizable renal changes much higher values are encountered. From our observations it seems advisable to place the limit of normal at 0.55 for urea and 0 50 gms per L. total incoagulable N and -60 for the freezing point. Evidences of retention greater than this are referred to as cumulative phenomena.

Cryoscopy has been employed in 34 cases, 43 determinations having being made. Variations from −0 48 to −0.71 were encountered. In every instance except one a normal phthalein has been associated with a normal freezing point. In this case No 31 δ was −0 61 with a phthalein practically normal, 48 per cent for 1 hour The urea was close to the higher limit of normal, 0.47 gm. per liter

The highest δ (−0 48) occurred in a man who was being continuously forced to drink large quantities of water

Nine cases showed cumulative phenomena in that they had a δ lower than −0 60 Except in the case No 31 already mentioned renal function was seriously involved in each instance as indicated by phthalein and the general clinical condition.

A decrease in phthalein output of serious import may be associated with a normal δ In a group of 4 cases Nos. 5 22 38 and 43 a trace or less than 10 per cent phthalein was excreted in 2 hours, but the freezing points were normal These cases were all seriously ill clinically and in the only two cases, 38 and 43 in which blood urea was determined, it was found to be abnormally high, 2 17 and 1 50

gms. per L. respectively. Repetition of tests 5 days later showed in Case 43 a δ −0.66 and a urea 2.64 gm. per L. This patient died in uremia, while in the other case operation was refused and the patient sent home on account of his poor general condition.

Blood urea was determined in 12 cases. In every instance in which the phthalein was high the blood urea was normal. Abnormally high urea content was encountered in four instances only, Cases 7, 27, 38 and 43, in all of which the phthalein was low. In Cases 38 and 43 urea was a better index to the renal condition than the cryoscopy which, as has been pointed out, gave normal values. It would therefore appear that the urea may afford indications of cumulative phenomena earlier than the cryoscopy.

In no instance was a normal blood urea associated with markedly decreased phthalein. Case 37, however, with 27 per cent phthalein for 2 hours showed 0.35 gms. urea per L., while the δ was −0.61.

From a consideration of these data it appears that our previous claims in relation to the value of phthalein were well founded. The phthalein undoubtedly affords the truest index of the functional capacity of the kidney in this group of cases. In no instance was its findings incompatible with the clinical condition and subsequent history. Corroborative evidence only was adduced from the employment of the other tests, particularly valuable in this connection being the presence of cumulative phenomena. In several instances however the tests of retention failed to indicate the serious nature of the renal change, so that the findings of these tests can only be considered of great value when marked retention is indicated. The almost constant suppression of lactose in these cases, although rendering the test useless, is an interesting phenomena. From the standpoint of explanation, this is worthy of investigation. Urinary diastase and urea are of about equal value and are unreliable indices to renal functional capacity generally but where very low values are persistently indicated they have some prognostic significance.

Cumulative phenomena do not occur in the presence of good renal functional capacity and consequently the tests are unnecessary where the phthalein is normal. They do not occur constantly or early in presence of even marked renal involvement, and consequently would prove misleading in a certain proportion of cases with phthalein not employed. Positive cumulative phenomena, however are of the greatest prognostic significance.

CONCLUSIONS

To detect the functional impairment associated with the renal changes consequent upon obstruction in the lower urinary tract, the phthalein affords an indispensable index to the true renal condition. Nothing beyond corroborative evidence is to be obtained from the employment of other functional tests.

THE INTERCAROTID PARAGANGLION AND ITS TUMORS

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SURGERY

By Donald C. Balfour, M. D.

TUMORS of the intercarotid paraganglion have as a rule been found malignant and recurrences following their removal are frequent. Whether this be due to the fact that the tumors are seldom operated on in an early stage or because of a high degree of primary malignancy is not clear. In the cases heretofore reported the tumors have varied considerably in size and frequently have been designated as perithelioma in type. The diagnosis is rarely if ever made before operation and usually not until pathologic examination reveals the histologic picture.

The removal of a tumor of this gland, because of its situation and malignancy often entails somewhat drastic measures. Its position in the carotid notch in certain cases necessitates ligation of one or all of the main arterial trunks. In the case reported herewith removal of 4 cm. of the internal jugular vein was necessary.

The patient operated on in the Mayo Clinic was a woman 34 years of age who came for examination because of the distress incident to a large degenerating adenoma of the thyroid. The history of the patient was not suggestive except in regard to the gradually increasing pressure and severe pain radiating through the right shoulder and down the right arm. The physical examination revealed an enlargement of the thyroid 5 × 6½ inches, marked evidences of obstruction in the deviated trachea, and dysphonia. Laryngoscopic examination demonstrated a paralysis of the right vocal cord. Otherwise the physical findings were inconsequential.

On April 5, 1923, under light ether anesthesia, the right lobe of the thyroid, which contained the degenerating adenoma, was removed. After completing the removal of the gland and ligating the vessels, further investigation revealed a separate mass in the right submaxillary region about the size of a lemon, having the appearance of a degenerating foetal adenoma. At first this was believed to be an aberrant thyroid, but on attempting its removal it was discovered to be of an entirely different character suggesting the probability of some malignant condition. The tumor was firmly adherent to all the surrounding structures and apparently had been crowded up into the submaxillary triangle by the enlarged thyroid. After freeing it in front and below it was found on deep dissection to be intimately connected with the deep vessels. The mass was dissected from the carotid vessels, but it had invaded the internal jugular vein and it was necessary to remove about 4 inches of this structure. This invasion of the vein made certain the malignancy of the tumor and although the growth was removed *en masse* it seemed probable that more or less rapid recurrence would take place. The field of operation was swabbed with Harrington's solution and a 4-hour pack of the same used to inhibit implantation of malignant cells. The patient's convalescence in the hospital was uninterrupted; she left on the sixth day. During her stay in town she suddenly developed a hemiplegia, which persisted until she left for her home. A recent report indicates the persistence of the hemiplegia and probable local recurrence.

The after history of patients in whom tumor of the intercarotid paraganglion has been removed is not encouraging. A cure without permanent disability is rare. Keen (1) who first called the attention of the American profession to the condition, states that only 7 patients of the 27 cases collected by him (including one of his own) recovered without complications. Ordinarily if the patient does not succumb to recurrence, some disability which is usually due to brain lesion occurs.

ANATOMY, PHYSIOLOGY AND PATHOLOGY

By Franz Wildner, M. D.

Anatomy. In 1743 Albrecht von Haller (2) found a nodule about the size and shape of a kernel of wheat at the point of bifurcation of the common carotid artery. Anatomic dissection revealed that the little body was inserted in the fibers of the sympathetic nerve plexus which forms a dense meshwork around the common carotid artery and its branches. It may be found either at the crotch of the artery or in its immediate neighborhood closely adhering to the wall of the vessel. The common carotid artery or one of its branches gives off a small vessel supplying the arterial blood.

Further descriptions of the tumor may be found in Dr. Wildner's article.

Von Haller (2) based his conclusions on the findings obtained by gross examination and regarded it as one of the numerous ganglia distributed into the course of the sympathetic nervous system He named it intercarotid ganglion," thus classifying it as a nerve-structure.

In 1862 Luschka (3) made several hundred examinations with the object of studying its anatomy The carotid body was found in every case. This author was the first to make detailed microscopic examinations of the tiny organ.

According to his findings, the carotid body is a globular or oval shaped structure measuring from 5 to 7 mm. in length, 2½ to 4 mm. in breadth and 1½ mm in thickness It is found either in the bifurcation of the common carotid artery or on the posterior wall of the internal carotid so that it is not distinguishable anteriorly For this reason it has been termed retrocarotid body by French writers.

Its color is a greyish red up to a shade of purple-red, depending on the amount of blood filling the capillaries It is fairly dense, and occasionally it may be broken up into halves with more or less of a connecting link between rarely in four or five particles which are scattered over quite an extended area and in the course of the internal carotid artery In this respect it resembles the parathyroids, of which especially the upper one is sometimes divided into two or more units, with occasional cell-groups in the lateral lobes of the thyroid completely surrounded by thyroid acini. A homologous organ is present in all mammalian animals at the bifurcation of the carotid or in its vicinity

On microscopic examination Luschka (3) found cells with a large protoplasmatic body grouped into clusters and strands of various size, a large number of thin capillaries surrounding the cell clusters, and very numerous sympathetic nerve-fibers with scant ganglion cells. The parenchymatous cells were the characterizing feature and assuming their epithelial origin he presumed that the anlage of the carotid gland buds off from the epithelium of a branchial cleft He regarded the enigmatic body as a gland closely attached to the cervical portion of the sympathetic nervous system, and applied to it the term intercarotid gland. He placed it in series with the adrenals, the anterior or glandular lobe of the hypophysis, and the coccygeal gland.

The carotid gland the anterior lobe of the hypophysis, and the coccygeal gland, though differing in minor details to the extent of establishing their individual independence, are similarly constructed Large cells resembling epithelial cells arranged into lobules of various size and shape in close anatomic relation with the sympathetic nervous system The coccygeal gland found just in front of the apex of the coccygeal bone and associated with the median sacral artery is about 2 to 3 mm. in diameter and bears closer resemblance to the carotid than to any of the other glands It is a constant single organ. Not infrequently it is represented by five or six small nodules. It contains a great number of capillaries and many fibers from the ganglion impar of the sympathetic.

These organs belong to ductless glands, blood vessel glands or glands with internal secretion, following Claude Bernard (4) who distinguished the external secretion of bile — through an efferent duct — from the storage and mobilization of glycogen as internal secretion

It is interesting to note that thirty years before the first cases were reported by Marchand (5) and Paltauf (6) Luschka (3) expressed the opinion that the vestige of the carotid gland may give rise to the growth of tumors.

Arnold (7) took a few different from that of Luschka (3) He was impressed by the large number of capillaries which occasionally formed whorl like structures comparable to glomeruli, and concluded that the organ was characterized by a network of capillaries, the walls of which were coated by large cells To him it was a vascular structure which he named intercarotid arterial glomerule

Waldeyer (8) accepted Arnold's (7) view in the main He regarded the large epithelial-like cells as especially differentiated cells of the adventitia of the capillaries and therefore as constituents of the vessel-wall He made a distinction between the endothelium of the capillaries and the large perithelial cells and introduced the term perithelial

organ for organs built on the plan of the carotid or coccygeal gland.

A new era has been opened by Schaper's (9) article on the histology of the carotid gland. He showed that many microscopic findings described as the carotid gland were artefacts due to autolysis of the very unstable protoplasm of the cells. He emphasized the examination of fresh tissue and demonstrated that only chromic acid or its salts were able to fix the cell structure in a way reflecting the picture of fresh tissue. He pointed out that the epithelial like cell-groups notwithstanding their close relation to the capillaries, are independent of them the capillaries showing a continuous endothelial lining and the same structure as elsewhere in the body.

Stilling (10) agrees with Schaper (9) as to the independence of the cells from the capillaries, and he finds that some of the cells take a brown tinge after fixation with bichromate of potassium the self-same cells are found in small corpuscles attached to the abdominal part of the sympathetic, which he is inclined to class as accessory adrenals. In summarizing he thus emphasizes the structural analogy of the carotid gland with the adrenals: "I believe myself to be able to confirm that the carotid gland whatever be its embryonic origin, is neither a simple vascular network nor a rudimentary organ, but a blood vessel gland of a structure analogous to that of the adrenal."

In a very logical investigation, Alfred Kohn (11) showed why so many authors, though unraveling numerous elements of truth, failed to arrive at a satisfactory explanation. They had studied the fully developed organ and had allowed themselves to be carried away by some dominant features on which they laid undue stress. They had in turn regarded the minute structure as a ganglion, a gland an epithelial organ a vascular organ, and a rudimentary organ. Kohn took the position that the nature of an organ is determined by the nature of its specific cells. His was an histogenetic viewpoint, and he attempted to trace the development and the textural structure from the earliest stage up to the developed organ. First of all he disproved the alleged epithelial character of the cells. Epithelial cells are found lining outer or inner surfaces of the body they show a clean-cut borderline toward the underlying connective tissue and a polar orientation the free surface being differentiated from the base. The carotid cells are found in the midst of connective tissue and heaped up without any trace of orientation or polarity. He concludes that the utmost lack of regularity as to size and arrangement of the cells rules out their epithelial nature, and contends that they are a type of cell altogether different from epithelial endothelial, or perithelial cells. Another peculiar feature of the cells is the unstability of their protoplasm. Specimens removed later than 45 minutes after death showed marked changes of the cells due to autolysis of the cell-substance. Experimentation with the various fixing fluids proved that only chrome salt solutions are likely to fix and preserve the protoplasm in its natural condition, at the same time staining it often a faint yellowish tint or any shade from a light yellow to dark brown. All other fixatives as formalin absolute alcohol, or sublimate dissolve certain substances of the cell body the nuclei only remaining intact in a protoplasmic network with irregular meshes. Kohn named the cells "chromaffin cells" on account of their chemical affinity to chrome salt solutions. These cells are large and mostly polyhedric, though very polymorphous in appearance the protoplasm is almost homogeneous or faintly granular. The nucleus is round or oval and shows a dense chromatin network with one or more nuclei and a sharply outlined nuclear membrane. Mitoses are found, though rarely.

A very large number of non-medullated nerve-fibers enter into the formation of the carotid gland typical ganglion cells are found scattered or in small groups in the sympathetic nerve fibers. Kohn (11) then proved by comparative studies the close relation between the cells of the carotid gland — the chromaffin cell — and the non medullated nerve-fibers. He found groups of chromaffin cells embedded in the sympathetic nerve-fibers (Fig. 1) running to the carotid gland much as ganglion cells are interwoven into the tracks of nerves. In the supreme cervical ganglion of the sympathetic

small groups of chromaffin cells are found. There is a continuous stretch of chromaffin cells extending from the carotid gland through sympathetic nerve-fibers to the supreme ganglion of the sympathetic. Here typical ganglion cells, chromaffin cells and nerve fibers are found in closest union. The finding of the chromaffin cell — the characteristic element of the intercarotid gland — in sympathetic nerve-fibers and ganglia led to the assumption of a closely allied kinship between the carotid gland and the sympathetic nervous system.

Small islets of chromaffin cells are found in the sympathetic nerves and ganglia from head to coccyx (Fig 2) Large autonomous organs are built up in the retroperitoneal space in close neighborhood to the abdominal aorta. The most proximal part of the abdominal paraganglion dips down into portions of the Wolffian body and the union of these two widely different organ-systems shapes the adrenal gland (Fig 3) Its medullary part is a part of the sympathetic derived from the ectoderm, while the cortical part is part of the renal system derived from the mesoderm.

Another large paraganglion is the "accessory organ of the sympathetic" (Zuckerkandl (12)) found at the site of bifurcation of the abdominal aorta, which is well developed in the new-born, being 10–15 mm. in length and 3–5 mm. in width. Small paraganglia are found in the space between the adrenals, kidneys and ureters, in the interiliacal angle in the mesorectum and broad ligament (11) (Fig. 4) All paraganglia outside the adrenal medulla undergo involution after birth.

The *chromaffin cell, which is the structural* unit of the carotid gland, the medulla of the adrenal, and the accessory adrenals of the sympathetic, is a derivative of embryonic cells of the sympathetic The embryonic cells of the sympathetic — sympathoblasts — differentiate into adult sympathetic ganglion cells and nerve-fibers, but some of them form chromaffin cells, *a cell which retains to a certain extent the features of the embryonic ganglion cells* The author believes that the undeniable epithelial appearance which so deeply impressed itself on many workers may be a heritage of the epithelial origin of the nervous system which traces its derivation back to ectodermal epithelium. Thus the chromaffin cell is closely related to the ganglion cell, but it does not form fibrils which are characteristic of the ganglion cell. Like the ganglion cell it appears either singly or in smaller or larger groups embedded in the track of sympathetic nerves, or like the more differentiated ganglion cell, it may form individual organs. Kohn (11) introduced the term paraganglion for organs made up of chromaffin cells to express their histogenesis from the embryonic ganglion cell.

Another term parasympathetic organs," expresses their histogenetic and anatomic relationship. Chromaffin cells develop in all parts of the sympathetic nerve anlage, in the cervical as well as the abdominal and sacral part of the sympathetic system yet in certain locations they form large aggregations and independent organs. The intercarotid paraganglion the adrenal paraganglion — the largest of the body — and the abdominal paraganglion are all made up of chromaffin cells derived from the embryonic sympathetic cell They all retain their initial kinship with the sympathetic system in the fully developed organism.

In the human new-born chromaffin tissue is very widely distributed, but an involution sets in in early life and no chromaffin cell is found in the adult sympathetic (rests of chromaffin cells remaining in the carotid gland and the adrenal) In mammals it is a permanent structure (Vincent)

It has been shown in embryos of the cat, pig, and man that the cells of the intercarotid paraganglion develop from embryonic ganglion cells of the sympathetic at the ventral side of the internal carotid artery (Fig. 5) While the majority of the embryonic sympathetic cells develop into typical sympathetic ganglion cells and nerve fibrils, a small number form sphere-shaped groups, the beginning of the alveolar structure of the zellballen (Fig. 6) These sharply defined zellballen are the unit of the adult intercarotid paraganglion they take up at a later stage the chromaffin reaction. The fully developed organ then recedes from the wall of the internal carotid artery and descends to a point at or near the bifurcation

on its way it has dragged sympathetic nerve fibers with typical ganglion cells along leaving in its trail a few scattered chromaffin cells. Kohn's (11) view of the nervous origin of the intercarotid paraganglion has been confirmed by subsequent investigations. It is interesting to consider that we have returned to the position taken by von Haller (2) in 1743. He based his sound and simple argument on the facts disclosed by gross dissection slightly modified, his standpoint represents the best supported modern views.

In summarizing, one may say that the chromaffin cell — the structural unit of the intercarotid paraganglion — is found in the whole realm of the sympathetic nervous system, proving its histogenic unity. Although the chromaffin cells are derived from the sympathetic nervous system yet there is good evidence that they perform an internal secretion in adult life. The internal secretion of the adrenal has been established since the time of Addison (13) in 1855. It is reasonable to use the term gland for secreting organs no matter what their morphologic origin is. Apparently the terms paraganglion and gland will be used promiscuously for the aforesaid organs, depending on the point from which they are viewed. There seems to be a close union between the nerve and vascular system in the paraganglia, the chromaffin cells throwing their secretion directly into the circulation under the stimulation of the sympathetic nervous system.

Physiology. The intercarotid paraganglion shows, like all other paraganglia, an extremely rich vascularization. This fact in itself seems to indicate a very active metabolism. Only the largest paraganglion of the body, the medulla of the adrenal, has thus far received due attention. Adrenalin, when administered intravenously will cause marked increase of arterial blood pressure due to its contracting effect on the unstriped muscle fibers of the arterial wall, combined with decrease in pulse rate and increase of the force of the heart beat. Glycosuria also results. Claude Bernard (4) produced glycosuria by stimulation of a point at the floor of the fourth ventricle and concluded that the stimuli traveled by way of the sympathetic system to the liver causing a glycogenolysis. In recent studies on rabbits it has been shown that this experiment fails after removal of the adrenals or severance of the sympathetic or splanchnic nerve. In the light of this additional knowledge it seems that stimulation of certain points of the brain may be conveyed in the track of the sympathetic to the adrenal medulla, causing a secretion of adrenalin with its glycosuric effect. Adrenals removed from animals on which Bernard's (4) experiments had been made showed a lesser pressor effect on the vascular system than the intact adrenal and microscopic examination disclosed diminution or absence of the chromaffin reaction of the cells of the medulla. The various stages of physiologic activity of the secreting cells correspond to definite morphologic pictures, and the secretion appears in the shape of droplets which are evidently thrown into the thin-walled capillaries.

Josue (14) found in rabbits which he had injected for some time intravenously with three drops of adrenalin 1:1000 arteriosclerosis of the aorta and larger arteries.

There are some observations that seem to lead to the assumption of an important rôle played by the intercarotid gland. The wealth of sympathetic nerves running into it, the chromaffin cells in immediate contact with capillaries, only a thin endothelium intervening, the unstability of its protoplasm and its rapid autolysis after death seem to indicate the presence of a highly sensitive chemical substance.

The writer was able to find only a single instance of an experimental investigation into the function of the carotid paraganglion. Frugoni (15) cites Vassale (16) who noted, after bilateral destruction of the organ a considerable glycosuria of a passing nature or cachexia leading to death. Frugoni (15) showed that intravenous injection of 5 ccm. press juice obtained from the carotid glands of suckling calves would kill a rabbit in one or a few minutes; there were convulsions, paralysis of respiration and failure of heart action. The blood of the injected animal lost its clotting property and the visceral organs were markedly hyperemic. The main action seems to be on the vascular system. Small doses of

extract have a depressor effect on the vascular system it is antagonistic to adrenalin.

Pathology Marchand (5) published the first case of a tumor of the intercarotid paraganglion in 1891 Paltauf (6) reported four cases in 1892 The most striking feature of all these tumors was their location at the angle of bifurcation of the common carotid and their close adherence to the wall of the arterial vessels. In four out of these five reported cases the tumors could be removed only with resection of the common carotid artery and its branches, while in the fifth case the tumor was shelled out without damage to the vessels. The tumors showed also a great similarity in their microscopic structure. Marchand (5) concluded that the tumor was of a peculiar structure, which could be derived only from a certain well-defined anlage. Paltauf (6) regarded the four tumors he reported as peritheliomas of the carotid gland The conclusions arrived at by these two authors are the more convincing as they were drawn independently Since then, about 35 cases of tumor of the intercarotid gland have been reported in the literature. With three exceptions they were all removed by operation. The three tumors found at post-mortem are among the smallest in the series, being about the size of an almond or English walnut The typical location of the tumors is the angle of the bifurcation of the common carotid the growth as a rule adhering to the wall of the artery Sometimes the common carotid artery is seen passing into the tumor (Scudder (17)) In other cases the arteries lie in deep grooves in the tumor

When the tumor is firmly adherent to the wall of the vessel its removal is feasible only after resection of the common carotid artery and its branches. In some cases the internal jugular vein, the sympathetic, vagus, hypoglossal and lingual nerve have been removed together with the carotid tumor In a few cases the tumor being loosely attached to the wall of the vessel, could be shelled out without damage to the arteries, or with ligation of the external carotid only (6 8 19 17 20)

The size of the tumor which is well encapsulated, may be that of an almond usually that of a hen's egg, and in some cases of a goose egg Some have the shape of a potato and have been termed "potato tumors" of the neck.

The color depends on the color of the tissue proper and the amount of blood filling the capillaries. It may be a white, reddish grey brownish red or even dark purple. The transparency and the glossy appearance of a freshly cut surface have been noted in several cases, occasionally reminding one of a parenchymatous goiter (1) The consistency depends on the relative amount of cells and fibrillary tissue it may be firm, hard, rather elastic, or sometimes as soft as brain tissue. The capsule is fibrous, smooth, thin and contains a large number of thin-walled veins. Fine strands of connective tissue run from the capsule toward the center producing a lobulated appearance, and a sponge-like structure is produced by the presence of very numerous enlarged capillaries. The cut surface is characterized by its homogeneity and evenness of texture. In several cases that came to post mortem a search was made for the intercarotid paraganglion at the bifurcation of the vessel and in the surrounding tissue, but no trace of it could be found while it was invariably present and of normal size on the other side. It was further observed that the tumor derived its arterial blood supply from the common carotid or from one of its branches near the bifurcation in the same manner as does the intercarotid gland The stroma of the tumors is usually more developed in the center than on the periphery

On going over the tumors of the intercarotid gland one is impressed by the almost perfect identity of the salient features of all of them There are certain differences in the various individual tumors and there are variations in the pictures of sections taken from various places, but these differences appear secondary and are due to degenerative changes that have taken place

Microscopically the tumors show an alveolar structure with thin capillaries forming the stroma. The cells of the alveoli are grouped irregularly and show a homogeneous protoplasm without partitions between the individual cells. In other cases the cells are rather well defined polyhedric or round. The



Fig Fig

Fig. Sympathetic nerve from the vicinity of the carotid paraganglion. In the midst of it group of chromaffin cells.

Fig. Sympathetic ganglion from the pelvic portion of the ganglion cord (foetus of 7 months) One half of the ganglion taken up by the chromaffin cells (chrs) (From A Kohn.)

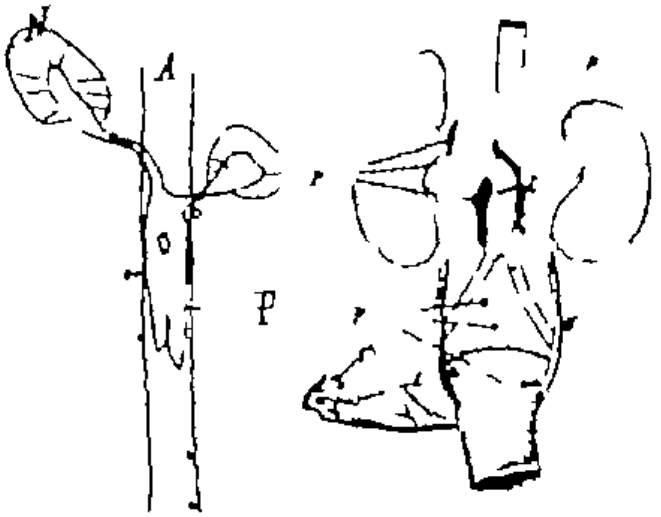


Fig 3 Fig 4

Fig. 3 Paraganglion of new-born rabbit Diagrammatic drawing. X A, aorta, N adrenal, P aortic paraganglion forms the medulla of the adrenals with its cranial terminals (From A Kohn)

Fig 4 Paraganglia of gnl (45 day old). A, aorta N adrenal, U ureter R, rectum; L, broad ligament, P,p, major and minor paraganglia. On the left the adrenal has been removed in order to show the paraganglia on its posterior surface

nuclei are round or oval sharply outlined showing a number of chromatin nodules immediately below the vesicular membrane, and resembling plasma cells Monckeberg (21) noted in two of his cases that the protoplasm of specimens fixed in Muller s or Zenker s fluid showed excellent preservation while another tumor fixed in formalin showed the same foam-like structure of its cells as is shown by the formalin fixed cell of the normal organ He laid stress on this reaction as being the chemical proof of the origin of the tumor from the carotid gland. A few of the cells of one of his tumors took up the yellowish tinge characteristic of the chromaffin cell.

The capillaries show a continuous endothelial lining, the cells being set directly on the endothelium The width of some capillaries is remarkable and accounts for the porous structure of some of the tumors. Hyaline degeneration is apt to set in in the walls of the capillaries, especially in the center of the growth.

Syncytial cell groups and giant cells are occasionally observed Karyokinetic figures are seen in the tumors, sometimes in large numbers

Tumors of the intercarotid paraganglion are made up of chromaffin cells, the elements which form the normal structure Whenever a tumor of a paraganglion — a paraganglioma — is suspected, it should be fixed in a solution containing chromic acid or its salts. A mixture of ten volumes of 3½ per cent solution of bi chromate of potassium and one volume of formalin gives an excellent fixative After 24 hours fixation the tissue should be mordanted in the bichromate solution for two days then treated in the usual manner The intercarotid gland may be divided into several portions and chromaffin cells found in places distant from the bifurcation. We may then find chromaffin tumors at a distance from the bifurcation for instance at the jaw (22)

The tumors of the carotid paraganglion are rather benign, slow-growing neoplasms. They begin as hypertrophies of the normal organ and grow 5 10 even 37 years (19) without causing any discomfort. Though they adhere very closely to the arteries, only one case hitherto reported (Marchand s (5)) showed penetration of the arterial wall and two small nodules of tumor tissue in the lumen, one exactly at the bifurcation and another a little higher up in the external carotid

In the case herein reported the tumor was removed from the right side of the neck of a woman 34 years of age. After multiple adenomas of the thyroid had been removed a mass



Fig. 5. Pig embryo, 45 mm. Section through nerve plexus (p) to ventral side of internal carotid (ci). Ganglion cells in diffuse arrangement. Grouping of cells into acini (a b) the anlage of the carotid paraganglion. (From A. Kohn)



Fig. 6. Pig embryo, 87 mm. The cell alveoli (a b) have increased in size and multiplied. The organ shows the finished appearance. (From A. Kohn)

was found lying high up in the neck running up to the angle of the jaw very densely adherent to all surrounding structures involving the internal jugular vein, a portion of which was removed with the tumor. The tumor measured 5 x 7 x 4 cm. was well encapsulated (*Fig. 7*) and could be shelled out without injury to the arteries. It was of a greyish red color very even on section, of a live rubber consistency and remarkable transparency (Fig. 8). The internal jugular vein was loosely plugged with tumor tissue 4 cm. in length. The microscopic structure is analogous to the previously reported cases (Figs. 9 and 10).

Metastases in lymph nodes have been noted in a few cases. Recurrences have been noted in about one fourth the cases. Hyalin degeneration of the capillaries has been noted in a good many cases.

Systematization. The study of the organogenesis of the intercarotid paraganglion has shown its origin from the primitive sympathetic anlage and has attached this apparently isolated and vestigial corpuscle to the sympathetic nervous system. The embryonic sympathetic cell — sympathoblast or sympathogonia — develops into the sympathetic ganglion cell and nerve fiber on the one hand and the chromaffin cell on the other.

Sympathoblast (Sympathogonia, embryonic sym. cells)

Sympathetic ganglion cell and nerv. fibers — Chromaffin cell (Paraganglion, parasympathetic organ)

It is interesting to examine the neoplasms of the sympathetic in the light of the facts put forth. Elements representing the various stages of embryonic development and differentiation may go into the making of sympathetic tumors.

Sympathoblastoma (Lymphogonioma, ganglioma embryonale sympathicum)

Ganglioneuro (fibro) m. — Chromaffin tumor (Paraganglioma Parasympathicum)

Tumors consisting of these elements may occur at any point of the central nervous system—on the cerebrospinal nerves, on the sympathetic with its distribution, and in the visceral organs.

The sympathoblastoma may occur anywhere within the boundary of the sympathetic, preferably in the adrenal medulla of newborns or children. It is a malignant tumor with metastasis to the liver and other organs (23, 24, 25, 26, 27, 28, 29, 30). Full blown ganglion cells and nerve fibrils constitute the ganglio (neuro) fibroma. They may arise from the ganglionated cord (31, 32, 33), they may be interposed between kidney and adrenal (34) or between spine and kidney (35). Wegehn (36) found 14 out of 18 cases of the ganglionated cord on the left side. Herxheimer (37) found among 28 tumors 17 arising from cord ganglia, 11 from the medulla of the adrenal or its vicinity.

A chromaffin tumor — a paraganglioma — may develop from any paraganglion of the body; so far only few tumors have been ascer-



Fig. 7. Case No. 823 8. Outer surface of tumor with resected internal jugular vein at upper pole plugged by tumor-tissue.



Fig. 8. Case No. 8 3 8. Cross section of same tumor

tained (38, 39, 21 40 41 42 43). These cases are tumors of the adrenal and intercarotid paraganglion and the coccygeal gland.

The adrenal medulla may develop all the possible tumors of the sympathetic tissue the embryonic neuroblastoma, the ganglioneuroma and the chrome brown tumor or paraganglioma. The cortex of the adrenal produces the so-called adrenal hypernephroma as typical tumor (44, 45).

Sacrococcygeal tumors should be carefully examined for the presence of chromaffin cells they may be derived from the coccygeal gland (40, 46). Tumors of the nervous system should be fixed in a formalin bichromate mixture in order to preserve the chromaffin cells.

Excessive and defective physiologic activity associated with tumors of the glands of internal secretion. What is the relation between the neoplastic cell and its normal mother-cell as to physiologic function? From microscopical examination, production of bile by the cells of a carcinoma of the liver and production of colloid in carcinoma of the thyroid have been known for a long time. The metastases of these tumors may occasionally secrete bile or colloid. Even under such conditions as exist in the bone-metastasis of a thyroid carcinoma colloid in the acini has been seen. On the other hand, we have clinical evidence that the carcinoma of the thyroid may aggravate the symptoms of hyperthyroidism. A degenerating fœtal or adult adenoma may produce toxic symptoms without exophthalmos (45).

Assuming a correlation between the changes in form and the changes in function we may expect a hyperplasia of an organ to be combined with a hyperfunction perhaps followed later on by hypofunction with the beginning of secondary tissue degeneration. Acromegaly is associated with an adenoma of the eosinophilic type of the anterior lobe of the hypophysis (47 48).

Tumors arising from the posterior lobe of the hypophysis may bring about the clinical symptoms of a high limit of sugar assimilation adiposity lowered blood pressure slowed pulse subnormal temperature asthenia, and drowsiness (49).

Neoplasms of the pineal gland of young males may bring on rapid growth of stature, hirsuties and a premature sexual development, with corresponding change of the frame of mind (50).

Of the tumors of the adrenal we have to differentiate between those arising from the cortex and those from the medulla. The adrenal hypernephroma is apt to produce abnormal sex characteristics when present in females. The symptoms seem to be the more pronounced the younger the individual. Hirsuties especially on upper lip neck and chin and chest, cessation of menses, atrophy of uterus and ovaries, obesity and a change of voice have been observed (51). In men, a



Fig 9 Case No 8 3 8 Microscopic section low power, showing the capillaries and alveolar cell groups.

Fig 10 Case No 8 3 18 Same section, high power capillaries with continuous endothelial lining Note the nuclei of endothelial cells

gigantic increase in bodily strength has been observed (45)

Chromaffin neoplasms of the adrenal medulla, with the symptoms of hyperfunction of the adrenalin-producing tissue, were observed in a few instances. The clinical symptoms were those that can be experimentally produced by repeated adrenalin injections glycosuria, hypertrophy of the heart, especially of the left ventricle, high blood pressure arteriosclerosis (found in a baby 2 years of age) (52)

In view of these observations on the evidence of physiologic function in the cells of neoplasms of glands of internal secretion, one would expect to find evidence of the physiologic function in the presence of the enormous overgrowths of the intercarotid gland. In none of the reported cases of tumor of the intercarotid gland has a hyperfunction of chromaffin tissue been noted perhaps one of the reasons may be that it has never been looked for

Function, pathology and clinical manifestations of the chromaffin system the intercarotid gland in particular are little known and the cases of tumor of the carotid gland have usually been diagnosed at the operating table, after having been designated as lymphoma or adenoma of the thyroid. The tumors of the intercarotid glands are by no means as rare as has been generally supposed. The Index Medicus shows three papers for the first six months of 1913

It would seem rational that in cases of tumors of the carotid gland the whole chromaffin system be examined and evidence of its hyperfunction be carefully sought after The writer would tentatively advance the hypothesis that the carotid gland tumor is but an anatomic expression of a functional disorder of the chromaffin system affecting one or more units of the same. A bilateral overgrowth of the carotid gland has been observed by Enderlen (53)

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CONCERNING APPARENT CURES OF RENAL TUBERCULOSIS

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AMONG the many interesting features of renal tuberculosis none is more important than the apparent cures of the disease. The dispute between the relatively few practitioners who would treat renal tuberculosis without operation and the many who urge prompt nephrectomy as soon as the diagnosis is made, can only be settled by a clearer understanding of what the apparent cure of renal tuberculosis means. The underlying difficulty in reconciling the opposing views is probably a lack of thorough understanding of the relation between the *pathological lesion in the kidney caused by* tuberculosis and the symptoms arising therefrom. Thus it is not generally appreciated that the variations in the patient's general health as well as in his renal or vesical symptoms are due to alterations in retention (renal or vesical) or to changes in the activity of pelvic or vesical lesions, rather than to changes in the kidney parenchyma.

Every case of early renal tuberculosis submitted to operation places in our hands a pathological specimen suggestive of the fact that the renal lesions are far older than the duration of symptoms would suggest. Indeed, the mere presence of surgical tuberculosis in the parenchyma of the kidney causes no symptom. Upon this fact it is scarcely necessary to insist. The familiar case history with its exclusively vesical symptoms is sufficient evidence that the lesion in the kidney parenchyma does not make itself felt until *one of two things happens. Either it extends* through the capsule and excites perinephritis or else it extends to the pelvis and there sets up a tubercular pyelitis.

Perinephritis is rare and need not concern us.

Tubercular pyelitis is common. Doubtless the painful and frequent urination which is so often the most prominent early symptom of the disease is at the outset due entirely to tuberculosis of the pelvis and ureter. Judging from the specimens I have seen, *this tuberculosis* usually takes the form of a disseminated, subepithelial infiltration of the mucous membrane with little tubercles which give to the mucosa a pebbled appearance, similar to that produced by pyelitis cystica.

At this early stage the cavity of the kidney pelvis is usually very slightly dilated (apparently by relaxation of its walls). There may be no ulceration excepting that upon the papillæ the source of pelvic infection. Yet even with lesions so slight as these the patient may be urinating every hour with considerable straining and terminal pain. If the *kidney is removed at this time the frequent* urination is checked as if by magic and does not return.

The next important pathological change consists in the extension of the tuberculosis to all the layers of the pelvis and ureters and to the bladder. Upon the mucous surface the tubercles ulcerate, and upon the outside they excite that adhesive inflammation about the pelvis and ureter with irregular thickening of the walls of these channels, which is so characteristic of renal tuberculosis. As a result of this ulceration and infiltration the lumen of the excretory channel becomes more or less completely obstructed and the region above the obstruction dilates. Inasmuch as the cavity of the kidney pelvis itself often becomes almost completely obliterated by this process, the dilatation may affect only one portion of the kidney though it usually affects the whole kidney. Exceptionally the obstruction *is in the ureter and the pelvis* itself is widely dilated instead of being contracted.

As a result of these pathological changes, renal colic may occur from the passage of blood clots or shreds of fibrin or tissue, or pain in the loin may result from distention of the kidney or perinephritis while a more or less definite sensitiveness and dragging pain in the side may result either from the tension in the kidney and its pelvis, or from the dragging of the shortened and thickened ureter *or from perinephritis*.



Fig. Kidney sclerotic pelvis little thick Ulcerated papilla at lower pole. The caseous upper pole has been torn y



Fig. Loaded catheters in both ureters Collargol injection of right kidney (left in figure) shows dilated calyces and suggests enlargement of lower pole

But if the ureter is not shortened and if the retention either in one pole of the kidney or the whole kidney is sudden and complete instead of being gradual and incomplete the patient's discomfort may suddenly cease (either with or without renal colic) Even though the tuberculosis has extended down the ureter beyond the point of stoppage if urine ceases to flow through the ureter the symptoms will promptly cease whether the flow of urine be checked by nephrectomy or by plugging of the duct

In the light of these facts the varying history of patients with renal tuberculosis is readily understood The great majority of them constantly have frequent and painful urination and though from time to time very considerable remission of the symptoms may occur these never entirely disappear and as the inflammation progressively invades more and more of the bladder the general tendency is for the urinary distress to become more and more marked Some patients fail rapidly in general health on account of partial retention usually in the kidney pelvis, less often in the bladder But the exceptional patient may continue to have fairly good drainage and exhibit the most extraordinarily good general health.

On the other hand once in a long while one encounters a case of renal tuberculosis whose symptoms have suddenly and completely ceased and who has apparently regained perfect health without operation. Such a case I have seen but once The patient suffered in the early 90's from many renal colics upon the right side and from a certain amount of bladder irritation. Tubercle bacilli were found in the urine In 1895 Dr McBurney explored the right kidney but failed to find anything wrong with it and did not remove it. Within a few days of this operation the patient had a frightful renal colic, and thereafter all of his symptoms ceased. He remained entirely well until 1912 when he again began to have pains in the right side and rapidly lost weight At the time I saw him the right ureter seemed

Indeed ... possible that partial obstruction of the kidney resulting in stoppage of the affected flow just ... the disappearance of the associated urinary ... may equally be followed by cessation of symptoms



Fig 3 Parenchyma normal Pelvis pebbled Cystic lower pole due to healed tuberculosis

absolutely occluded It transmitted no urine and would admit no catheter while the left kidney and bladder seemed entirely normal The diagnosis of carcinoma of the gall-bladder and liver was made and confirmed by the prompt death of the patient. The right kidney had evidently ceased to functionate at the time of the last renal colic and had been a dead organ for 17 years, thereafter With its shutting off the lesion lower down the urinary tract subsided.

That this is an unusual case is attested by the experience of every one of us. I have operated upon thirty-one cases of renal tuberculosis and seen perhaps as many more who have either been operated upon by other surgeons or who have refused operation and never yet have I seen its mate Several of my cases however have shown for long periods of time a very considerable remission of symptoms Two of them have remained entirely without symptoms, respectively for two and six years at the end of which periods the symptoms returned and I removed the kidney

The first of these patients, an Irishman, 37 years of age came to St Vincent's Hospital in February 1901 giving the following history Never had venereal disease was heavy drinker had pneumonia two years before admittance and showed scar on his neck from a gland which suppurated at that time. His urinary history was one of hemorrhage six years before he had had a profuse, spontaneous, painless hematuria. This ceased after a day or so Three months before admission the bleeding reappeared and lasted two days. At the time of entering the hospital he had been bleeding again for seven days. He showed no other symptoms relative to his urinary organs and had lost no weight. As soon as he entered the hospital the bleeding stopped and he went through an attack of delirium tremens, lasting two weeks. At the end of this time physical examination revealed a very large, low kidney on the right side and slight pulmonary dullness at the left base. In 24 hours he passed 47 oz. of urine containing 1 3 per cent urea, some red and white blood cells, and no pus Phenolsulphonephthalein was injected and after a delay of 1 minutes he passed 10.5 per cent in the first hour and 8 9 per cent in the second.

Cystoscopy showed a normal bladder and normal ureter orifices With a 6 filiere tip ureter catheters were readily introduced 5 cm into each ureter and in the first 8 minutes 5 ccm. of urine were obtained from the enlarged right kidney containing, besides the usual blood and epithelial cells, numerous casts, a few leucocytes and 1.3 per cent urea Urine from the left one only 3 ccm. were obtained with 0 3 per cent urea, no pus and no casts The phenolsulphonephthalein appeared in 8 minutes from the right kidney in 9 from the left. In the first 30 minutes, thereafter 3 per cent was excreted from the right side, only a trace from the left and in the following 30 minutes 5 6 per cent from the right side and 1.7 per cent from the left There was no pus in any of the urinary specimens

Here was a curious state of affairs The patient symptoms suggested tumor and the marked enlargement of the right kidney suggested that the tumor was unquestionably on the right side yet the functional test showed great deficiency in the excretion, both of urea and phenolsulphonephthalein from the left kidney Accordingly I cut down, first upon the left kidney found its upper third converted into a cheesy mass, obviously an ancient tuberculosis Turning the patient over a small incision sufficed to reveal that the right kidney was very low hypertrophied to twice its normal size but otherwise apparently normal Turning back to the left side I therefore removed the left kidney the patient making an uneventful recovery Maximum temperature after the operation was 100 4 F and the wounds healed by primary union

On looking back at the case the presence of the casts in the urine from the right kidney and the markedly deficient excretion from the left side together with the absence of casts, should have warned me of the presence of

renal tuberculosis on that side had I but seen some pus. For casts on one side and deficient function with pus and without marked enlargement of the kidney upon the other side is very suggestive of unilateral tuberculosis

But the second, and for our present purpose the most important feature of this case is the distribution of lesions of the infected kidney (Fig 1) Its upper pole was converted into a cheesy mass the remainder of the kidney showed a few evidences of beginning tuberculosis scattered here and there the most notable of which was an ulceration upon one of the lower papillæ. The pelvis of the kidney was not far from normal We may make the pathological and clinical pictures coincide by assuming that the original lesions were at the upper pole and closed with caseation of that pole, that the kidney pelvis was but little infected and that with spontaneous shutting off of the tuberculous lesion in the upper pole the whole process became quiescent for six years only to break out again with precisely the same process at the lower pole If this patient had come to autopsy after being killed in an accident, at some time between the first and second outbreaks of his renal tuberculosis, his kidney might have gone down in history as proof that renal tuberculosis can and does heal with only partial destruction of the parenchyma Fortunately the science of medicine has been spared this shock.

My second case illustrates this temporary healing after partial destruction of the kidney even more strikingly The patient, woman 38 years of age as brought by her physician for cystoscopy in July 9 She as in excellent general health and complained only of spontaneous cystitis (frequent and painful urination ith pus) of six months' duration, which had been entirely unaffected by treatment but had ceased spontaneously month before sh came t me A few days thereafter she had single hematuria Cystoscopy showed nothing abnormal in the bladder excepting swollen, inflamed right ureter orifice The ureters were both readily catheterized to the renal pelvis. Five ccm of indigo-carmin was injected this appeared from the left kidney in 3 minutes from the right in 3 minutes. The urine from the left kidney contained 8 per cent urea no pus and no casts that from the right kidney contained per cent urea, pus, no casts and no t bercular or other bacteria, by smear Guinea pigs were inoculated with the bladder urine and survived

She was seen again in November 19 0 and November 19 each time free from symptoms but passing urine which contained a very faint trace of albumin and few pus cells.

On January 3 9 3 she returned, stating that after slight vesical irritability which had lasted for two months, she was suffering a distinct bladder irritation for two days Cystoscopy showed little vegetating mass at the right ureter orifice and some inflammation about this Ureter catheterization drew from the right kidney urine containing 0 4 per cent urea. pus and tubercle bacilli by smear while the urine from the left side showed 0 75 per cent urea and a few leucocytes The X ray showed an enlarged right kidney and an injection of collargol into this (Fig. 2) showed that hile the pelvis was not dilated the enlargement was chiefly confined to the lower pole

Upo these findings the right kidney was removed. Its lower pole was found replaced by two large cysts, containing bloody serum. The remainder of the kidney was so normal that most competent pathologist was unable to find any lesions in it even suggestive of kidney tuberculosis (Fig 3) But the pelvis though normal in every other respect was studded with little spots which proved on section to be miliary tubercles. Her symptoms ceased upon removal of the kidney her wound healed by first intention.

Here then is a second case of partial healing of renal tuberculosis with remission of symptoms for two years. As we look at these two specimens, I think we may anticipate the day when specimens similar to these shall be made the basis of a plausible but entirely unwarrantable pathological attack upon nephrectomy for the cure of renal tuberculosis. To forestall this is my excuse for presenting them before you.

THE RÖNTGENOGRAPHIC DIAGNOSIS OF GALL-STONES AND CHOLECYSTITIS[1]

By LEWIS GREGORY COLE, M D New York City
Professor of Radiology Cornell University Medical College

THE rontgenographic diagnosis of gall stones and cholecystitis is a subject that has interested rontgenologists and diagnosticians since the earliest use of the X rays. It seemed reasonable that the rontgenographic method of detecting renal calculi would likewise reveal biliary calculi But repeated failures led most of us to abandon hope, and for a long time not even to attempt the examination With the increasing number of cases examined and the use of an intensifying screen and soft tube, gall stones were occasionally detected This led me to the routine examination for gall-stones in all cases presenting symptoms referable to the right hypochondrium The number of positive diagnoses which I have been able to make proves that the examination is justified but a negative diagnosis should never be made where there is no evidence of a calculus

Several observers have reported individual cases where gall-stones have been detected Three cases were reported by Pfahler in 1911 In 1913 Thurston Holland reported three cases, and called attention to the necessity for differentiating right renal calculi from biliary calculi. This point alone justifies careful consideration of the subject. Gall-stones and cholecystitis have been observed rontgenographically in 20 out of 500 cases examined for gastro-intestinal lesions, and I believe that the systematic search for them by the method described in this article will reveal them in a much larger percentage of the cases examined Before studying the rontgenographic indications of gall-stones and gall bladder infection, the anatomy of this region should be noted There are three possible locations for stones ix in the gall-bladder the cystic duct and the common duct But such considerations, and also the frequency with which infection occurs with or without calculi are questions not within the scope of this communication

INDIRECT EVIDENCE OF BILIARY CALCULI

The rontgenographic indications of gall stones are direct or indirect. Direct evidence consists of a characteristic localized area of increased density corresponding in size and shape with a calculus. Indirect evidence is afforded by the distortion of the adjacent hollow viscera by adhesions from an accompanying cholecystitis (Figs. 1 to 6) The indirect evidence will be considered first because of its greater importance. Moynihan states that it is now a matter of general acceptance that gall-stones are caused by infection If this is true the indirect evidence is more valuable than the direct evidence, and indeed my experience has borne out this theory In 30 per cent of the cases the lesion was detected solely by indirect evidence and in 60 per cent of the cases the indirect evidence was a most important factor I believe that the deformity of the cap and pars pylorica or the kinking and constriction of the hepatic flexure are stronger rontgenologic indications for surgical procedure than the presence of a calculus in the gall-bladder without evidence of adhesions involving the hollow viscera In such cases it is immaterial whether the infection is due to gall-stones, typhoid or some unknown cause, or whether it has been of sufficiently long standing to allow the formation of calculi In view of the numerous post mortem discoveries of gall-stones, which did not cause symptoms sufficiently severe to justify surgical interference It is obvious that the important point to determine in cases of unimpacted calculi is whether the stones are associated with cholecystitis extensive enough to cause symptoms The accompanying adhesions manifest themselves in an

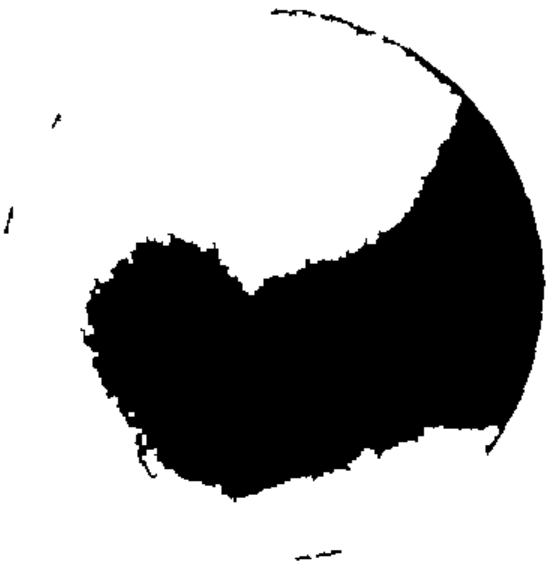
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In addition to gall-stones Proc M J 1913 No 2714

Case presenting this paper before the Atlantic County Medical Society on May 9th Dr Cole of Berlin has published an article on gall-stones Arch Roentg Ray 1913 September



Fig



Fig



Fig 3



Fig 4

Fig Contraction of cap and pars pylorica by adhesions from cholecystitis with calculi invisible roentgenographically Proven by surgery

Fig 3 Indentation in greater curvature in which lay small, atrophic gall bladder containing calculus invisible roentgenographically Proven by surgery

Fig Absence of cap Sphincter edema on lesser curvature Cholecystitis with calculi invisible roentgenographically Proven by surgery

Fig 4 Adhesions of cap and pars pylorica from cholecystitis \ calculus visible roentgenographically Surgery imminent

alteration of the lumen of the stomach, cap or hepatic flexure of the colon

DIRECT EVIDENCE OF BILIARY CALCULI

Regarding direct evidence of gall-stones, two things must be considered first the detection of the calculus, and second, its differentiation from a renal calculus or some other calcareous body in this region especially a calcified costal cartilage The possibility of detection depends upon the percentage of mineral salts in the stone or surrounding a cholesterin nucleus, upon the thickness and density of the surrounding tissue, and the penetration of the \ ray tube A soft tube a very short exposure, and the use of an intensifying screen will give a wealth of detail impossible to obtain by ordinary methods In-



Fig 5



Fig 6



Fig 7



Fig 8

Fig 5 Adhesions of cap, pyloric sphincter and para pyloricum, from cholecystitis with calculus visible roentgenographically (see Fig 24) Proven by surgery

Fig 6 Adhesions of cap from cholecystitis with calculus visible roentgenographically)

Fig 7 Pressure on essential sac and cap by four gall-stones Anterior view Proven by surgery

Fig 8 Same case as Fig 7 Posterior view

testinal content is often thus accentuated, and must not be mistaken for gall-stones I have not found that the twisted position of the patient, claimed by Pfahler as an essential to the diagnosis of gall-stones, is of any particular advantage

In some instances the calculus is shown so clearly that there is absolutely no doubt of its presence. In other cases it is so indistinct (Fig 22) that it can be discovered only by making several roentgenograms, superimposing two or three of them and examining them carefully against the sky A stereoscopic study of two roentgenograms made with the tube in the same position or at slightly different angles sometimes aids very materially in the detection and interpretation of doubtful shadows Occasionally an accumulation of

gas or air artificially injected into the colon will accentuate the stone in a remarkable manner The organs surrounding it are relatively dense to the X rays. There are stones which are no more opaque to the rays than the tissue which surrounds them, and there are others which are as opaque as the densest renal calculus. Between these two extremes are stones of all degrees of density The technique above described will enable one to detect a relatively large percentage of biliary calculi

Differentiation between biliary and renal calculi The differential diagnosis of biliary calculi from right renal calculi is of great importance, and should be carefully made in every case presenting a stone in this region. The following points will aid in identification

First. Biliary calculi show more distinctly and appear smaller when the plate is placed on the abdomen than when the plate is placed on the back The opposite is true of renal calculi When the biliary calculi is well back in the cystic duct, this variation of size is not so great as when it is in the gall-bladder In such cases it is wise to place a small triangular marker on the abdominal wall and make two exposures, either on the same plate or on different plates, shifting the tube five inches between the exposures. Where two plates are used match the shadows of the lead marker and measure the distance between the two shadows of the gall-stone. In order to determine with accuracy whether the shadow is nearer the anterior or posterior wall of the abdomen, repeat the above process with the plate posterior and compare the distance between the shadows.

To determine distance of calculus from abdominal wall By measuring the distances of the tube from the plate and how far the tube is shifted between the exposures, the old principle of localizing foreign bodies described may be applied to find the distance of the calculus from the anterior abdominal wall

Let NQ = plane of the two positions of the tube
C and D = the positions of the tube
CD = 5" = distance between the positions of the tube
LM = plate parallel to plane NQ
Y = shadow of marker on plate
A = shadow of stone when tube is at D
B = shadow of stone when tube is at C
EY = so

To find XI —

By measurement AB is found to be
AX = 1½"
CD = 5"
DF = 1½

Lay off FX equal to EC

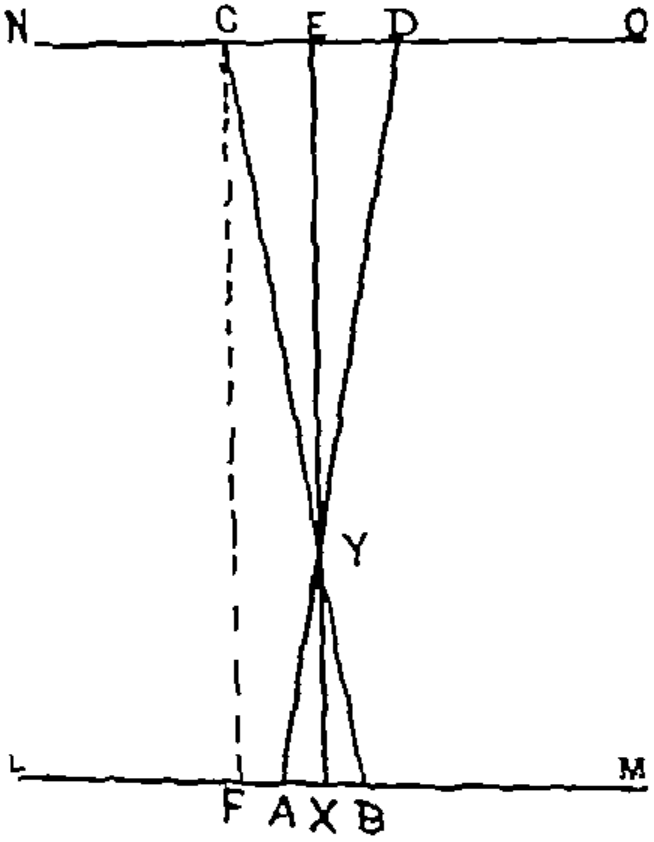
△ BFC and △ BXY are right-angled △ s, and have common acute < BCF

The sides of right angled triangles having common acute angle have the same ratio

FB : FC :: XB : XY or 3 : 5 :: 1½" : XY

XY = 3½

Q. E. D



Second The second differential point is the ring like shadow cast by a biliary calculus when there is a calcareous coating to a cholesterin nucleus. Renal calculi seldom if ever have this appearance.

Third When three or more biliary calculi are present they are likely to have faceted surfaces which are readily recognized rontgenographically If more than one renal calculus is present one is usually larger than the others, and the group frequently has the appearance of a large, branching phosphatic calculus.

Fourth. Moving the tube from side to side alters the relation of a biliary calculus to the kidney but it does not alter the relation of a renal calculus to the kidney

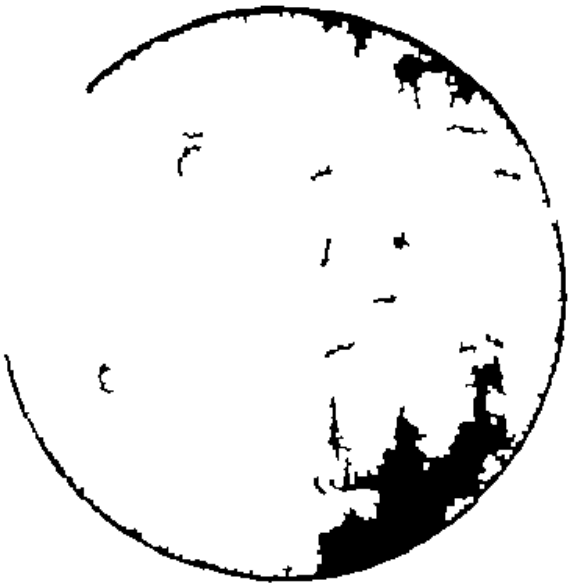
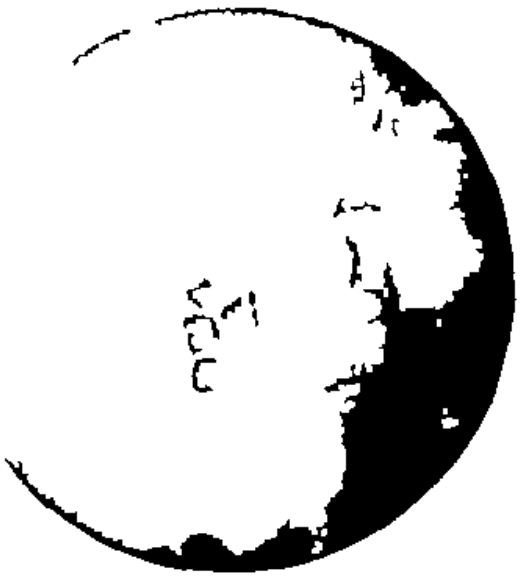


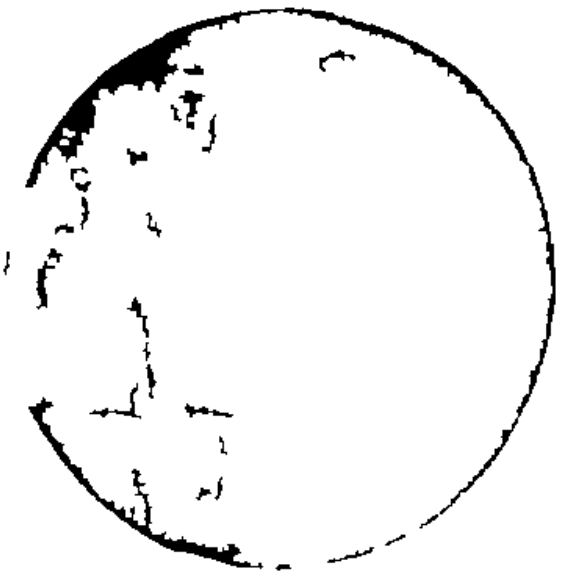
Fig 9



Fig 10



Fig



Fig

Fig 9 Same case as Fig 7 five days later Showing change in relative position of stomach Anterior view
Fig Adhesions of cap and part pyloric from
cholecystitis with five calculi Anterior view
Fig Same case as Fig Anterior view
Fig Same case as Fig 10 Posterior view

Differentiation from duodenal ulcer Adhesions from cholecystitis so closely resemble adhesions and cicatricial contraction from prepyloric or post-pyloric (duodenal) ulcers that it is sometimes difficult to differentiate between them. But if the lesion is sufficiently extensive to indicate surgical interference the differentiation is of more scientific interest than practical value. The points of differentiation between these conditions are as follows

Gall bladder infection is usually more extensive It involves the greater curvature and draws the stomach to the right causing an angulation of the cap. The cap may be involved in the adhesions but not more so than the pyloric end of the stomach There is no evidence of a localized area of induration of the cap and obstruction of its lumen is not as frequent as in cases of duodenal ulcer

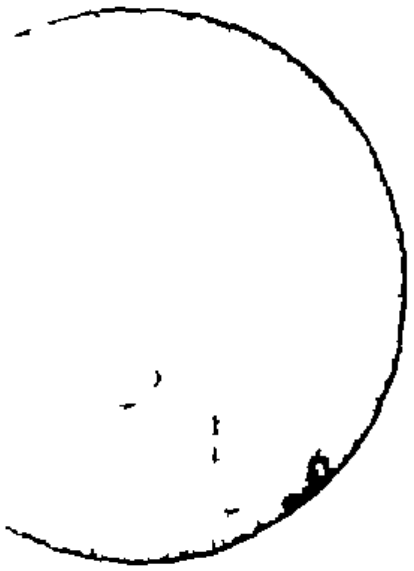


Fig. 3

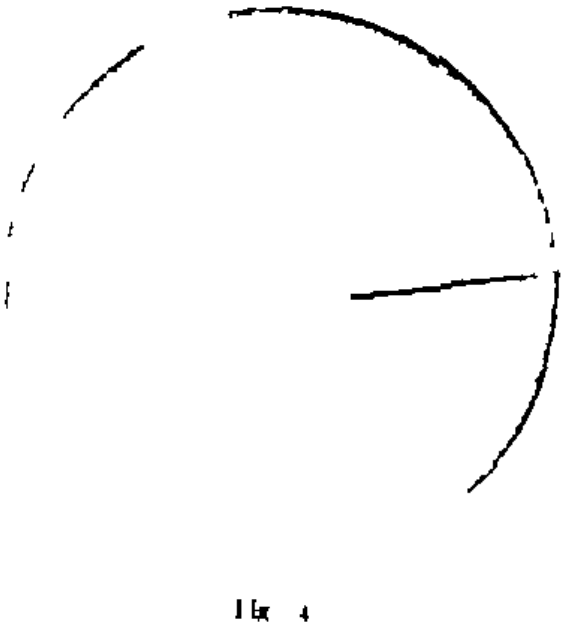


Fig. 4

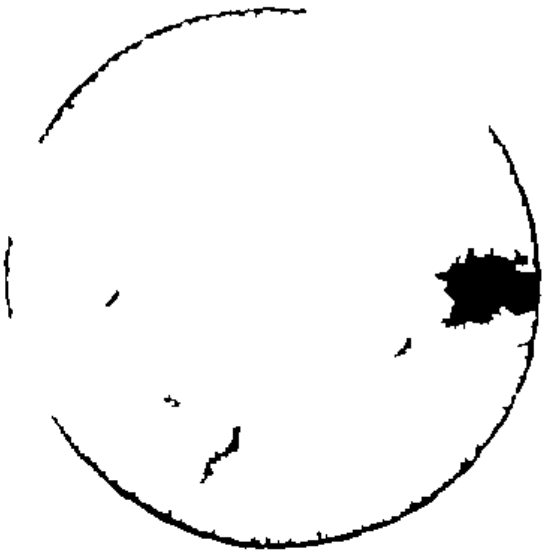


Fig. 5



Fig. 6

Fig. 3. Gall stone more dense near periphery than in centre.

Fig. 4. Gall stone more dense near periphery than in centre.

Fig. 5. Ring like appearance of gall stone having calculi of cholesterin in calcareous shell.

Fig. 6. Gall stone unusually dense to X rays.

CASE 1. March 9, 1923. This is the most interesting of all the cases. The patient had typical symptoms of renal colics except blood in the urine and was referred for examination of the kidney. The radiograms showed the region in question with sufficient distinctness for negative diagnosis of renal, ureteral and cystic calculus, and I advised gastric examination. This revealed permanently contracted pyloric adhesions involving the extreme pyloric end of the stomach. It was impossible to decide whether these adhesions were caused by duodenal ulcer or gall bladder infection, but stated that surgical interference was justifiable solely on the röntgenographic findings. The surgeon who operated was rewarded for his confidence in the röntgenological findings by finding cholecystitis with a number of small calculi not shown in the radiograph (Fig. 3).

CASE 2. December 19. There was a definite indirect evidence of adhesions involving the cap and pyloric end of the stomach but there was no direct evidence of gall stones. Some doubt existed as to whether the adhesions were caused by ulcer or gall bladder infection, but there was no question as to

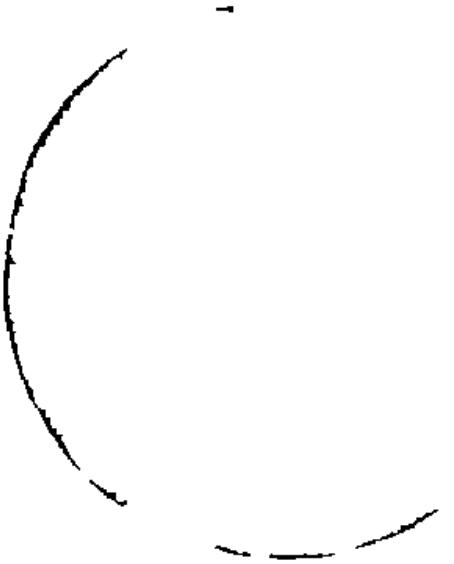


Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.

Fig. 7. Two small gall stones accentuated by an overlying accumulation of gas in colon.

Fig. 8. Large gall-stone one inch in diameter.

Fig. 9. Cup so contracted by cholecystitis that only its base on left side is visible. Calculus in close proximity. Anterior view.

Fig. 10. Same case as Fig. 9. Lateral view showing how descending duodenum encircles calculus.

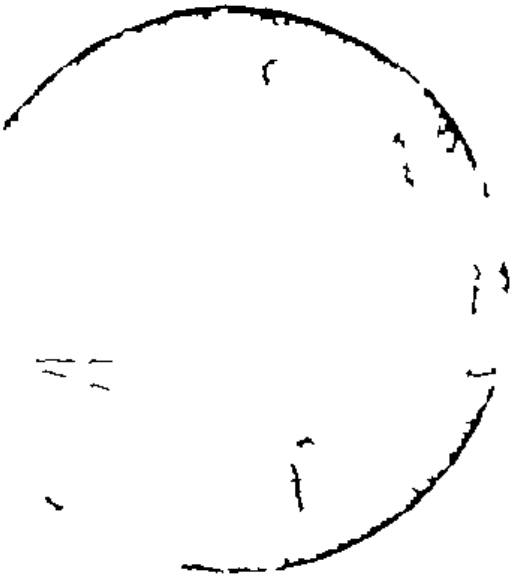
the advisability of surgical procedure. The lesion was found to be cholecystitis with gall stones, which were not shown roentgenographically (Fig.).

Case 3. January 3, 9 . In this case there was no direct evidence of gall stones, but there was a constant deep indentation on the greater curvature near the pylorus, resembling a small hour glass stomach (Fig. 3). I thought that this lesion was caused by an old ulcer and advised surgical procedure which revealed a small calculus about the size of an almond in a contracted gall bladder adherent to the gastric wall. This case has been frequently quoted as one in which I made an erroneous diagnosis. As a matter of fact, I recognized the location and extent of this lesion, and stated that surgical procedure was indicated, and I maintain that recognition of the cause of the lesion is of more scientific interest than practical value.

Case 4. January 0, 9 3. The patient had had a perfectly typical attack of cholecystitis, with temperature, local tenderness, and a marked degree of jaundice. The roentgenograms showed a contracted cap and irregularities of the sphincter and lesser curvature of the pars pylorica, both constituting definite indirect evidence of adhesions involving this region (Fig. 4). The patient recovered from this



Fig



Fig



Fig 3

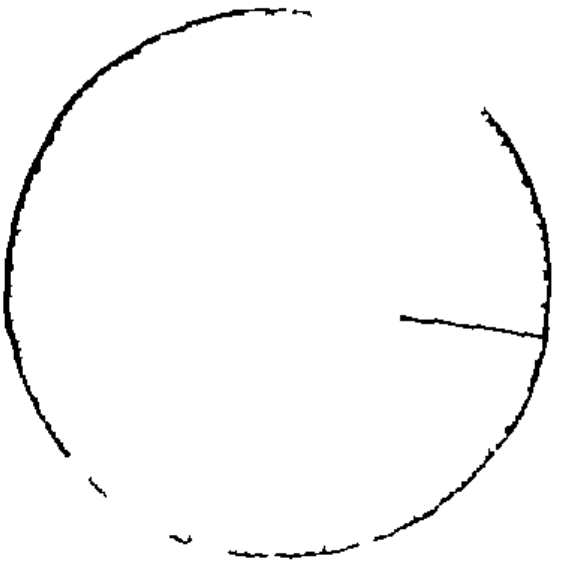


Fig 24

Fig C kaerous plaque in unde surfa of liv d uptowel rontgenographically sh g ll st one Proved by surgery

Fig 3 Gall stone Skiagram of compressing hook st

Fig T moderate l defined gall st ones Proved by surgery

Fig 24 Large faintly outlined g ll stone Proved by surgery For indirect evidence in this case see Fig 4

th k a d ha not t connec t d t surgic l procedure

(Mrch 9 Later I show both l nd enlarg t shadows of gall tone Although the nd s of more b gnost import nce th the d rect shadow A nd stract shadow of large bub s k l pres in all the radiographs (Figs 5 and 4) but the dila tions cr sed b th holed stones re so streng th t they may le me suspicions of arcinoma The follow g is quot tion from the ro tg nologic report

Th bowe of the duod m the co tracted cap th irregula ornm eaten ppearanc t the pylorus nd the bsenc of the p loric phinct indic t lesion in this region hich alls for surgical procedure Th lesion is probabl due sions from g ll bladder fection prol bly th calc li but considering th irregula rm eat n ppearance of the pylorus nd f th stom ch I do not f el j stfie in l minating arcinoma tous degen ration

Six months later not recei d from the patient husband st ted that she had not consulted surgeon B f llowing ct diet f ix month he is

greatly improved in health while he is not considered a permanent cure there is no longer any particular disturbance of the digestion or stomach.

Three months later this physician wrote me that the patient had suffered another sudden attack less severe than the previous attack which suggested gallstone trouble. Exploratory laparotomy was done and a large gallstone was found in the intestinal lumen having worked through the adhesions from the gallbladder and at the time of this last attack, caused perforation of the bowel and acute septic peritonitis resulting in the patient's death.

(Case 2.) January 20, 1909. *Both direct and indirect evidence of a biliary calculus were present, the stone resembling the one shown in Case 1, but it lies so far back in the cystic duct that the latter could not be seen in the anteroposterior roentgenogram.* In that case, the characteristic ring-like appearance of the calculus and the irregular surfaces or wanting to add difficulty in differentiating it from renal calculus. There were also indirect evidences of a surrounding biliary tract *with adhesions binding the pyloric and pylorus.* The distended gallbladder showed distinctly. The case was studied for a year, making three or four sets of roentgenograms and during that time the adhesions involving the cap increased and caused a gastric retention. *Surgical procedure revealed gallbladder* corresponding in size and shape with the roentgenographic findings, the gallstones and the accompanying bodily thickening (Fig. 6).

(Case 3.) January 21, 1909. This case illustrates *direct roentgenographic evidence of four gallstones* having the characteristic ring-like appearance. They show much heavier and appear smaller than the posterior roentgenogram. The clinical diagnosis prior to the roentgenographic examination was *duodenal ulcer. Surgical procedure revealed* a concretion of the appendix in addition to the gallstones. Note the presence of adhesions binding normal pyloric and pyloric sphincter. Making Lateral views of stereograms are like observing two pictures showing the same area in which the hue of blue is changed, round the head of the pylorus (Figs. 4 and 5).

(Case 4.) January 21, 1909. A perfectly transparent group of 6 calculi with faceted surfaces *shown in this case. The relation of these calculi* to the junction of the pyloric descending duodenum and their position were in the error of posteroanterior radiographs or the pathognomonic radiographic indications of gallstones (Figs. 6 and 7).

(Case 5.) I know this woman has not been operated, but there is no doubt of the diagnosis in this particular case.

(Case 6.) January 20, 1909. This woman was suffering from the posteroanterior roentgenogram are here shown (Figs. 8 and 9). The calculus did not have the characteristic ring-like appearance of faceted surfaces, but shifting of the patient changed the relation to the kidney. The patient was unfavorable surgical risk, and no operation was performed, and no examination made for indirect evidence.

Case 7. July 20, 1909. *The characteristic ring-like appearance of a calculus* which is much more distinct in the anteroposterior than in the posteroanterior roentgenogram (Fig. 15) is present in this case.

Case 8. December 1905. This patient was *examined for renal calculus. A distinct shadow* shown, slightly to the normal position of the kidney (Fig. 6). Operation failed to reveal renal calculus, but biliary calculus corresponding in size and shape with the roentgenographic finding was *found.*

Case 9. May 19, 1909. The clinical history one of acute attack of pain which had been diagnosed both gallstone and ptomaine poisoning. The indirect evidence showed persistent contraction of the cap and *irregularity of the pyloric* sphincter, believed to be either spasm or adhesions. Subsequent plates, made for direct evidence showed a clear-cut, well-defined shadow having the appearance of diphtheroid. There were *three* or *several plates but happened to be very much* centrated in one of the plates preventing a demonstration of gas in the overhanging gut (Fig.).

Case 10. May 20, 1909. For two years the patient had had occasional attacks of severe pain and *upon all previous occasions on fasting for six and* seven hours, nothing having more and he had lost thirty pounds in about a year. The roentgenogram showed direct evidence of large calculi had ceased to be kidney and directly in the position of the gallbladder (Fig. 8). The indirect evidence pylorospasm and contraction of the cap with possibility of some adhesion. There is record of the patient as having waited the summer is over before submitting himself to surgery.

(Case 11.) May 19, 1909. *The roentgenograms* (Figs. and 10) show both direct and indirect evidence. The cap is contracted and the pylorus sphincter irregular. Roentgenogram made in the lateral direction shows that the descending duodenum *contains gallstone.*

(Case 12.) October 4, 1909. The direct and indirect evidence are as plain as in Case 11 (Fig.).

The latest evidence obtained, calculus both interpreted as gallstone after most careful examination, including pyelogram of all of the methods previously described. The indirect evidence showed no adhesions, there perfectly normal stomach, pylorus and pyloric area. Surgical procedure failed to reveal biliary calculus, but there were bands in the omentum at the upper portion of the gallbladder, both of which showed slight adhesions, not however extending the pouch in the liver. A thick band of the omentum which held the stump of an appendix previously removed.

(Case 13.) January 26, 1909. The plates showed such slight ring-like shadow that they could be perceived only by viewing the plate against

the sky and it was difficult to differentiate them from calcified costal cartilages (Fig. 3). We traced the outlines of two complete and several incomplete rings and assumed that there were three or four calculi. Surgical procedure revealed only two calculi and a mass of thickened tissue.

Case 17. February 15, 1913. Here a calculus exactly the proper relation to the duodenum and hepatic flexure for gall stone but the patient was not a good surgical risk and the symptoms were not sufficiently severe to indicate surgical procedure (Fig. 4).

Case 18. March 24, 1911. A calculous body was present in series of 5 roentgenograms. The clinical symptoms were those of gall stones. Surgical procedure revealed gall stone but there was also a calcified gland palpable in the field of operation, so it is impossible to state whether or not this really was a gall stone.

Case 19. February 26, 1912. The findings in this instance were almost identical with those of Case 8. Patient has not yet been operated on.

Case 20. October 6, 1908. The plates all treating this case were loaned to the surgeon and lost track of. The diagnosis was that of gall stone a little larger than a pea one half inch to the outer side of the median line between the seventh and eighth ribs behind and opposite the end of the sixth rib in front. The surgical finding confirmed the diagnosis.

Indirect evidence of gall stones or rather of an accompanying cholecystitis as presented by adhesions involving the stomach cap duodenum or hepatic flexure is of more clinical value than the detection of the gall stones themselves because the adhesions represent an accompanying infection requiring surgical intervention while a gall-stone without infection may remain in the gall bladder indefinitely without causing symptom.

In conclusion I would state that gall-stones may be detected sufficiently often to justify a roentgenographic search for them but the absence of any direct evidence does not justify one in making a negative diagnosis, and should not prevent surgical intervention provided it is clearly indicated by the history.

Above all I plead for a differential diagnosis between right renal calculi and gall stones.

A FURTHER STUDY OF PERICOLONIC MEMBRANES

BY JOSEPH RILUS EASTMAN, M.D., F.A.C.S.
CHICAGO

PERICOLONIC membranes or pseudo-peritoneums present certain rather definite variations in structure, form, position and relation. However, a correct classification of these formations can hardly be made with our present insufficient and disconnected data relating to their nature and origin. For the convenience of study these anomalous membranes may be divided as follows:

Group 1. Those peritoneal sheets or ribbons which, because of their position and attachments, seem to represent exaggeration of normal anatomic fusions, folds, or ligaments, for example:

(a) Those representing in an exaggerated or *modified form*.—The phrenocolic ligament of Toldt, the costocolic ligament, the hepatocolic ligament, etc.

(b) Those representing in an enlarged or modified form.—The bloodless fold of Treves.

(This is not always bloodless. It may present parallel or irregularly disposed blood vessels.)

(c) Those representing in amplified form.—The fold of Reid (genitomesenteric fold or Lane band).

(d) Those representing in amplified form.—The crescentric upfoldings of serosa which divide the space lateral to the ascending and descending colon into peritoneal fossæ.

(e) Those representing in amplified form.—The attachment of the great omentum to the colon occasionally resulting in fusion of the omental serosa to the peritoneum of the colon throughout its length.

Group 2. Pericolic membranes which correspond in form and position to anomalous peritoneal fusions or folds which appear frequently in the fœtus, but which are not constant and therefore not anatomic, as:

(a) The parietocolic fold of Jonnesco. This is believed by Eisendrath, Greenfielder and Fallon to be a *normal anatomic fold*.

(b) The several so-called root folds.

(c) Nondescript peritoneal folds about the appendix and caput coli.

(d) Adhesion of the peritoneum of the colon to the upfolding peritoneum of its own mesentery (Robinson and Reid).

(e) A blanketing of the colon by the fused anterior and posterior peritoneal lamellæ of the great omentum. The fat of the omentum is absent. It may be replaced by an abundance of parallel blood vessels disposed as a rule transversely to the colon.

Group 3. Pericolic membranes occurring anywhere upon the large intestine, frequently over the splenic angle, which represent reaction to irritation of inflammatory or other character occurring in post-natal life:

(a) Membraniform adhesion occurring about the colon, the result of mild recurring peritonitis, often secondary to chronic colitis (Virchow and Gerster). These are similar to the pseudoperitoneum seen occasionally upon the broad ligament, the uterine fundus, and the uterine adnexæ. I have produced such formations in rabbits by prolonged administration of morphine and by anal ligation inducing coprostasis.

(b) Changes in the peritoneum of the colon due to pathology of the circulation, as hyperæmia or varicosities (Hertzler and Cuneo).

All of the varieties of pericolic membranes enumerated above have been observed in the *fœtus and whatever the fundamental processes* of pathology which cause these formations may be, it seems reasonably certain that those processes are often active in *fœtal life* and that all forms of pericolic membranes, with the possible exception of those embraced in Group 3, can be traced to fœtal fusion.

The failure to observe membranous pericolitis in young children has been interpreted with some reason as evidence showing that such membranes cannot be associated in any way with fœtal peritoneal anomalies, but on the other hand must in practically all cases,

be consequent upon certain agencies which do not become operative before maturity

It is true that membranous pericolitis has been observed much less frequently in children than in adults, but there are several quite obvious reasons for this. Abdominal operations for all causes are much less frequent in children than in adults. The simple controlled diet of children, their free indulgence in exercise, and other healthful habits of living protect them in some measure from the clinical process which pericolic membranes induce. If the clinical process be established in a child neurasthenia one of the conspicuous symptoms of pericolitis, is not always a part of it, therefore the condition may go undiagnosticated and unoperated. It is a mistake however to assume that membranous pericolitis does not occur in young children.

With a view to considering the collective experience of men who have large opportunities for observation in this field and thus perhaps to shed some light upon the question of the incidence of pseudoperitoneums in children, as well as upon the subject of their nature and origin communications of inquiry were addressed to representative teachers of surgery in this and other countries. Upon examination of the replies it appears that pericolic membranes have been observed during abdominal operations upon children by nearly one half of the surgeons addressed. By some of those who replied in the affirmative, the pericolic membranes were assumed to represent congenital sheets or bands as described by C. H. Mayo and Flint. By others the membrane forming pericolitis was looked upon as a condition secondary to colitis with subsequent mild repeated peritonitis, in the sense of Gerster and Pilcher. Others believe the membrane to be due to a combination of the causative factors mentioned above. However all of the following have found anomalous pericolic membranes in children of twelve years of age or younger. Roux, Stiles, Czerny, Albrecht, Lane, Willy Meyer, C. H. Mayo, M. L. Harris, Flint, Binnie, McArthur, Gerster, Greenfelder, Hill, Summers, Knott, Coffey, Connell, Porter, Eisendrath, Hertzler, Finney, Sherman, Seelig, Collins, Cheever, Freeman, and Haines.

Often in young persons Professor Roux has observed a veil of new and almost free peritoneum containing young blood vessels disposed transversely. The symptoms in these children were like those of chronic appendicitis. Roux observed these membranes at various levels upon the ascending colon. Stiles of Edinburgh has observed pericolic membranes in children from a few years of age upwards. Czerny has frequently seen anomalous peritoneal membranes upon the colon in children. M. L. Harris observed a typical Jackson's parietocolic membrane in a boy of twelve and Willy Meyer, C. H. Mayo, D. N. Eisendrath and L. L. McArthur have frequently observed Jackson's membrane in young children. Flint observed the membrane in children eight, ten, twelve and sixteen years of age and believes that they occur in the same incidence in children as in adults, the reason that they are not more frequently seen being due to the fact that we operate upon adult ten times more frequently than upon children.

Notwithstanding the reports of the surgeons mentioned above which give instructive evidence as to the not infrequent occurrence of membranous pericolitis in children it may be said that before conclusions are drawn as to the incidence of Jackson membrane in children, such clinical evidence should be supported by autopsy reports covering many examinations of the peritoneum in children. Flint supplies such supporting testimony received by him from Dr. Samuel Harvey, instructor of pathology in Columbia University. Harvey did 108 autopsies on infants from one to two years of age. In 16.6 per cent of the cases he found membranes of the parietocolic type. In 13.9 per cent of cases he found a membrane covering the caput coli. Lane's band or Reid's genitomesenteric fold was found in 9.3 per cent of cases. Flint says that the work of Harvey supplies the missing link between the fœtal structures and the adult veils and confirms absolutely their congenital origin and adds that he has no reason to change his views as expressed in his paper published in the *Johns Hopkins Bulletin* for October 1912 in which he stated his conclusion that pericolic membranes of adults are



Fig. 1.—Center of pseudomembraniform adhesion induced experimentally in rabbit by anal ligation.

instances where the secondary fusions of the peritoneum in embryonic life are more extensive than we are usually accustomed to consider the norm.

In 500 autopsies on children under six years of age Albrecht of Vienna found pericecal membranes present in about 5 per cent of the cases (Talbot).

Van Buren Knott report the cases of two infants one year old operated for intussusception who had well-developed Jackson's membranes.

Eisendrath has found pericolic membranes in children of all ages from four to sixteen and believes them to be of frequent occurrence in children. He believes, moreover that such pseudoperitoneums are foetal peritoneal folds which under some circumstances, like the normal pleura or any other serous membrane become infected and thickened, and then cause kinking and other forms of chronic obstruction.

C. H. Mayo, Harold Stiles, Sir William Bennett and others express the belief that membranous pericolitis must be of rather infrequent occurrence in young children, and this view is borne out by the experience of many surgeons who despite very great opportunities for observation, have not seen a case of Jackson membrane in a child. Some of them (Tinker, Schwyzer and others) look upon uncomplicated pericolic membranes as quite harmless deviations from the normal and having no special interest in them, do not seek them as a routine practice. Nevertheless the negative reports as to the incidence of membranous pericolitis in children are not without meaning in view of the quality and volume of experience represented by the following who have not observed pericolic membranes in young children: von Eiselsberg, Maylard, Handley, D'Arcy Power, Pierce Gould, Kellock Williams, Verhoogen, Pilcher, Crile, Walker, Bovée, Peterson, Montgomery, Morris, Murphy, Jackson, Ries, Deaver, Rodman, McMurtry, Kanavel, F. H. Martin, Bartlett, J. S. Horsley, Littig, A. T. Mann, A. A. Law, Grant, Moore.

It should be remembered, however that these men are surgeons and therefore would as a rule observe only such pericolonic membranes as are associated with clinical manifestations.

Several others who replied in the negative are gynecologists of large experience but who are called upon very rarely to make abdominal operations in young children. Verhoogen, of Brussels, speaks of the possibility of his having overlooked pericolic membranes in childhood for the reason that his attention has never been directed to them. Among those who had not encountered anomalous pericolic membranes in children, three remarked that they were doubtless present in childhood, but since it is the infective accidents of later life which bring them into the clinical field they escape observation in children.

A few of those who do not approve the hypothesis of embryonal origin of any variety of pericolic membrane report *the frequent*

finding of Jackson s anomalous membrane in association with cæcum mobile However this combination in itself furnishes evidence suggesting a fœtal origin, for in the mobile cæcum swinging as it does through an abnormally large arc, we have an instance in which a secondary fusion between the cæcum and the mural peritoneum may be drawn out readily in a degree and form quite beyond the norm.

Although it necessitates a digression from the subject matter of this paper it may not be amiss to call attention to another phenomenon which suggests a fœtal origin of pericolic membranes about the caput coli. It is the almost constant observation that when during operation for removal of the appendix vermiformis the uninflamed appendix is found buried under a pericolic membrane of the exaggerated Treves bloodless fold variety such a veiled and pocketed appendix is almost always of fœtal type — that is, long and very slender Such membrane-covered appendices are often not more than two millimeters in diameter and are rarely of a diameter exceeding three millimeters and show many evidences of interrupted development.

Almost a score of surgeons including Stiles, Mayo Verhoogen, Vander Veer Connell, Eisendrath, Summers, and McArthur answered the inquiry as to the origin of the membranes by stating their belief that they are developed in the fœtal period.

A somewhat smaller number including Handley Czerny Crile and Gerster incline to the belief that membraniform pericolitis is the consequence of a colitis spreading through to the peritoneal surface

A third group including Pilcher Morris, Finney Jackson Hill Kanavel Ries, and Horsley believe pericolic membranes, as seen in the adult to be in part congenital and in part acquired as a result of extension of inflammatory processes within the lumen

Gerster recognizing the part which persisting fœtal folds may have in adult intestinal pathology makes a sharp distinction between membraniform anomalies representing developmental accidents and those essentially different membranes which are consequent upon colitis He has frequently found the two varieties in association, and believes that



Fig Fusion between colon at splenic angle and omental serosa producing pericolonic membrane Result of anal ligation in rabbit

the congenital bands frequently represent the starting point of similar pathologic formations of adult life

Several surgeons in their answers volunteer the suggestion that pericolic membranes about the caput coli are more often the cause of appendicitis than the effect torsion, angulation, or compression of the appendix by the membrane so interfering with drainage as to lead to inflammation

There would have been, without much doubt, less divergence of opinion as to the absolute and relative frequency of pericolic membranes in children if the questions and answers had been formulated with a definite understanding as to what really constitutes a Jackson s veil as distinguished from a membranous adhesion

Anomalous peritoneal folds wherever and whenever found notwithstanding their variations in macroscopic and microscopic appear

ance are with respect to their nature and origin probably quite closely related The frequency of anomalous pericolic folds in the fœtus and the fact of their very common presence in young children indicate that *whatever the* fundamental pathologic process which causes them may be this process frequently becomes operative in embryonal life.

Concerning pericolic membranes which arise during adult life it seems fair to suspect in view of experimental evidence that they result, for the most part, from the adhesions of a plastic peritonitis, usually of mild chronic character Membranes thus formed are usually thinner and less vascular than those which date from the fœtal period and as remarked by Lardenois do not resemble embryonal peritoneum

The writer has experimentally produced such pericolic membranes in rabbits by inducing a low grade plastic peritonitis The *mild adhesive peritonitis occurred as the result* of the plugging of the large intestine with its own contents Extreme coprostasis was induced by intermittent ligation of the anus and administration of *morphine over a period* varying from two weeks to three months. Care was taken not to confuse the normal long flowing mesenteries of the rabbits with membraniform adhesions As in other quadrupeds the mesenteries of the rabbit are luxuriantly developed a single mesentery in some cases enveloping and supporting several intestines The membranous adhesions which were attributed to the artificially induced plastic peritonitis occurred in cases in which the intestines were held together over extensive areas by plastic lymph The membranes were brought to view by *separating the in*testines at the site of imperfectly organized adhesions

Such pericolic membranes are not different in histology and origin from similar membranes about the uterus and uterine adnexæ all representing reactions of the peritoneum to irritation

Of the types of pericolic membranes produced experimentally in rabbits as mentioned above one of the most common was that represented by a blanketing of the splenic angle with the fused anterior and posterior laminæ of the great omentum suggesting an exaggeration of the phrenocolic ligament of Toldt.

*Hertzler and Cuneo attribute those vascu*lar pericolic membranes, with vessels coursing horizontal to each other in the line of the long axis of the ascending colon or transversely to it to pathology of *the circulation Cuneo* believes that the blood vessels produce the membrane. It is, however no contradiction of the position of these writers to assume that the hyperæmia or varicosity spoken of by them, as well as the insufficiency of the muscular coat of the intestine mentioned by Tuffier suggest reactions of the peritoneum to irritation. Lenormant and Oberlin emphasize the importance of the relation of adhesion in plastic peritonitis to pericolic membranes They make a distinction, however between plastic membranous adhesions of adult life and those of *embryonal origin*

Adhesions in fœtal life probably bear the same relation to pericolic membranes as do adhesions of the adult It is probable that the true Jackson's membrane appearing upon the right half of the colon is usually an affair of fœtal development the result of accidents of cæcal descent and torsion. On the other hand membraniform adhesions of post natal life in the sense of Virchow Gerster and Pilcher may appear anywhere upon the large intestine the most frequent site probably being the splenic angle

In conclusion it may be said that it seems probable that several factors enter into the causation of pericolic membranes that the several factors are closely related that fusion *or adhesion as a result of reaction* to irritation, hyperæmia, or developmental accidents in the prenatal or post natal period may lead to anomalous peritoneal formation that in the fœtal period of development abnormal fusions occur with notable frequency and with interesting constancy as to location and form that pericolic membranes unassociated with chronic or acute colitis or peritonitis are of *fœtal origin and further that in a great meas*ure the same pathological processes underlie pericolic membrane formation at all ages

J de Chir 1911

Rev de gynec et de chir abdom Par 1911 Sept

DEPARTMENT OF TECHNIQUE

FIXATION OF FRACTURES BY MEANS OF AUTOGENOUS INTRAMEDULLARY BONE SPLINTS

B CHARLES I PHILLIPS M D Cantonsville C ul Zo P st
Ch ef of Surgical Clinic Colon Hospital

AT the present time there is probably no subject that has undergone the changes or made the advancement that we find taking place in the domain of bone surgery

We have seen the gradual evolution of the open treatment of fractures from its inception where the splendid result of few pioneers encouraged others to emulate their success Possibly through inferior technique or judgment in handling their cases the results were unsatisfactory This led to open objection by some disagreement and doubt by others as to the advisability of the open treatment of fractures Such remained the status of the open treatment of fractures until the results of the successful were multiplied and the mistakes of the unsuccessful were pointed out

We are indebted principally to Mr Lane for a technique which, if followed seemed to insure success Since the advent of his methods of operation we have seen the operative treatment of fractures increase enormously and it is still increasing

But while the use of the Lane plate is becoming more frequent, I believe the time is soon coming when we shall lay aside the Lane plate, the ivory pegs, and various other articles made use of by surgeons for the fixation of fractures and shall fix them without the use of foreign substances by means of autogenous bone splints or transplants

I shall consider only the use of the autogenous bone splint in these remarks because I am of the opinion the use of homogenous bone splints—those taken from another human body — kept in cold storage or otherwise is attended with so many difficulties of possible blood reactions, diseased conditions, or infections as to render its use undesirable at least for some time to come In using a foreign bone it seems we are exposing the patient to lot of unnecessary dangers to procure an inferior article I believe that the present state of our knowledge all will agree that the autogenous bone graft is far superior to that taken from another individual

Any one observing the effects of burying non absorbable substances in the human body has probably been struck first by the tolerance of the tissues to the foreign substance and secondly by the disturbance or untoward remote effects arising from a foreign substance which has remained quiescent in the tissues for a long time A foreign body Lane plate silver wire bone-peg or other favored substance is used in the fixation of a fracture. The wound heals per primum. The patient is discharged well. We note a perfect result and are satisfied.

Perhaps a year elapses, perhaps more when that patient comes back or goes to some one else complaining of pain at the site of the old break. A careful skiagraph shows a chronic osteitis which may subside with rest and immobilization to reappear later or it may persist until the foreign substance has been removed and the process may go on after the removal of the foreign body

The fixation apparatus may be tolerated without reaction by the tissues for many years when suddenly slightly lowered resistance in the general condition of the patient furnishes the opportunity for an endogenous infection Certain areas of the human body are by structure and secular supply more susceptible to infection than other portions and such condition we create in the contacting tissues by the insertion of a non-absorbable substance In this position, as in the natural vulnerable areas of the human organism infection does not necessarily follow in a certain length of time or ever for that matter but as long as the foreign substance is embedded, there is just as surely a point of lowered resistance and potential trouble and may become a nidus for infection at any future time For this reason the results of Mr Lane with his incomparable technique have been so excellent He recognizes the susceptibility of the traumatized tissues to any infection and averts trouble by a perfect aseptic technique

The difference between the old operation and



Fig. — Ratchet brace. Vise. 3. Hollow auger. 4. Twist drill bits. 5. Board on which bone is fastened.

the new does not lie in the primary operation. The damage to the tissues has been done when the fracture occurred. The operation is the same in *all cases and presupposes a perfect aseptic technique.* Primary liability to infection is the same in both cases, but the difference does lie in the *late manifestations of trouble arising from a* buried foreign substance on one hand and the autogenous bone splint on the other hand soon *becoming an active, living, integral part of the* bone in which it is inserted. It requires no removal, subjects the patient to but one operation, and *does not exist as a menace in subsequent years.*

There are several reasons why autogenous bone *splints have not been more widely used in the* routine fixation of fractures. Probably first and foremost among these has been the paucity of *suitable instruments.* Without suitable instruments the operation becomes impossible.

The operation of bone-plating achieved no popularity with the profession until suitable instruments were devised, thereby rendering the operation comparatively easy and a perfect asepsis possible. When the technique of fixation of fractures by autogenous intramedullary bone splints becomes perfected to *such a state it can be* performed with almost as little trouble as plating, and with as rigid an aseptic technique, I am firmly of the opinion the metallic plates, etc., *will* deservedly give way as the method of choice in the open fixation of fractures. Suitable instruments in the ordinary *surgeon's armamentarium for this* class of work are exceedingly rare. Outside of Dr. Murphy's most excellent medullary reamers and *retractor-guide, the special instruments* devised for this work are very few and, as far as I can discern, very unsatisfactory.

With an idea of what these instruments should be, I looked about and found a very satisfactory embodiment of my ideas in the tools of the car*penter and carriage maker. I believe that any* one with a fair amount of mechanical ingenuity and with sufficient practice on the cadaver or on *other bone to familiarize themselves thoroughly* with adjustment and use these instruments, will find them very satisfactory. They consist of:

(*a*) *Ratchet brace similar to those used by car*penters or wood workers.

(*b*) Twist drill-bits, about eight or ten in number *in graded sizes from about one-fourth inch in* diameter to five-eighths inch in diameter.

(*c*) One small vise with clamp to fasten to board — *the vise is a small affair weighing about* one and one-half to two pounds.

(*d*) One adjustable hollow auger such as is *used by carriage makers for fashioning the ends of* spokes that go into the felloe. It can be adjusted to cut tenons any size from one-fourth inch to one *inch in diameter and up ard.*

(*e*) A piece of ordinary board of suitable length to be placed in sterilizer and of proper thickness *for the attachment of the clamp of the vise.*

The technique is very simple. For instance, if it is desired to insert a transplant in a simple *fracture of the tibia. A linear incision is made* over the tibia, the ends elevated above the skin one at a time, drill bit selected which will just *clean the medulla out to solid bone.* This drill bit is put in the brace and the ratchet on the brace turned so the drill will turn in the right *direction.* The handle of the brace cannot be turned entirely around on account of the proximity of the leg, hence the necessity of the ratchet brace. The medulla is reamed for such distance of one or two inches as is necessary to secure firm socket for the transplant. The end is then dropped and the other end treated in the same way. The size of the bit is then noted and a transplant cut from the crest of the opposite

tibia by means of a drill and chisel, cutting a little larger than the transplant required. The vise is fixed to the board and this held firmly on the instrument table by an assistant. The transplant is picked up by means of forceps and one end of it is grasped by the jaws of the vise. The hollow auger is then put in the brace and by means of the screw is adjusted to cut a tenon the exact size of the drill bit used in excavating the medulla. The size of the tenon is shown by the gauge on the face of the hollow auger. The length of the tenon should equal the combined depth of both of the holes reamed. With the bone held in the vise in a few moments the transplant can be converted into a perfectly smooth, true fitting bone tenon of exactly the right size to fit the hole in the medulla. In the ordinary fixation of a simple fracture a long transplant is not necessary nor desirable. A transplant of one and one-half or two inches, provided it fits accurately is sufficiently long to hold in perfect position a fracture of femur, humerus, etc.

If a long transplant is required—more than four inches—it will be necessary to true up one end of the transplant as far as the hollow auger will cut (about four inches), then reverse the bone in the vise and true up the other end, taking care that the boring from one end meets accurately the boring from the other end. The bone is then taken by means of forceps and transferred to the place prepared for it where it will fit perfectly if the instruments have been properly adjusted.

The Lane technique may be carried out in using these instruments with the greatest ease.

If it is desired to insert a transplant between the ends of a bone a portion having been destroyed by accident or disease. For illustration, say there is a six-inch piece lacking in a tibia. To repair the defect a half-inch hole is reamed in the medullary canal of the upper fragment to a depth of say two inches. Another hole of the same diameter and three fourths inch in depth is made in the lower fragment. A transplant is cut from the opposite tibia eight and three-fourths inches in length by about five-eighths in diameter. Placing the transplant in the vise and with the hollow auger fastened in the brace and adjusted to cut a tenon one half inch in diameter and with the sliding gauge on side set for two inches in length, the upper end is completed. Reversing the bone in the vise and adjusting the gauge of length to three fourths of an inch the opposite end is completed.



Fig. Hollow auger showing face with scale of diameters and screw to adjust diameter and length of tenon cut.

This leaves the large part of the transplant six inches in length—just sufficient to fill in the gap. The upper or long tenon is inserted into the hole prepared for it. It has no lateral motion, neither can it push up farther into the medulla than the two inches cut by the hollow auger. Then by making a moderate amount of traction the lower end can be pushed into the hole prepared for it. The lower tenon has purposely been made shorter to facilitate insertion.

When in place the leg will be found to have the exact length required and will be rigid.

Regeneration of the transplant is undoubtedly greatly facilitated by extensive accurate apposition to living bone cells and by the immovable fixation in such a position.

The time required to perform the operation of fixation of simple fractures by means of the autogenous graft nearly approaches that required for Lane plating. With the old method of preparing a transplant, when to secure a fit was more or less accident, coupled with the design, there is no comparison.

These instruments can all be boiled to insure absolute sterility, can be procured from any dealer in carpenter tools, and at a trifling cost.

In conclusion I desire to thank Lieutenant Colonel J. L. Phillips, Assistant Chief Sanitary Officer, for permission to publish this paper.

INDIRECT TRANSFUSION OF BLOOD

BY ANDRE CROTTI M D COLUMBUS, OHIO
Surgeon to Grant Hospital and Children Hospital

ALTHOUGH thoroughly familiar with the technique of vascular surgery I have always felt that the direct transfusion of blood by arteriovenous anastomosis was a very delicate operation, and very often unsuccessful. Everyone who is familiar with that kind of work knows how difficult it is to anastomose properly for instance the small vein of a child with the large radial artery of a man and even when the anastomosis has been successfully performed there is no way of telling if the arterial blood is running into the vein and if it does, how much has been transfused. The operation is a long and difficult one. The same objections are true for the other methods of transfusion as for instance, when performed with small glass tubes prepared with albolene or paraffin. Therefore I sought to find a simpler method which might be just as efficient if not more and become more popular on account of its simplicity. It is called indirect transfusion of blood.

With Dr Shilling pathologist at Grant Hospital, I made a series of experiments on dogs in order to determine the coagulation time of the blood when withdrawn first, in a sterile, dry glass second, in a glass boiled in normal salt solution third, in a glass boiled in albolene. The average coagulation time was from five to eight minutes for blood withdrawn in dry sterile glass and from seven to twelve minutes for blood withdrawn in a glass boiled in salt solution or in albolene. Therefore I thought there would be plenty of time to withdraw blood with a syringe from vein and reinject it into another one without running any danger of coagulation. This was indeed successfully demonstrated in each of our numerous experiments. We were able provided that certain rules were followed, to withdraw several hundreds of cubic centimeters of blood from vein of dog and to reinject it into the vein of another without a particle of trouble and I was able to demonstrate the efficacy of the method in two cases which I herewith report.

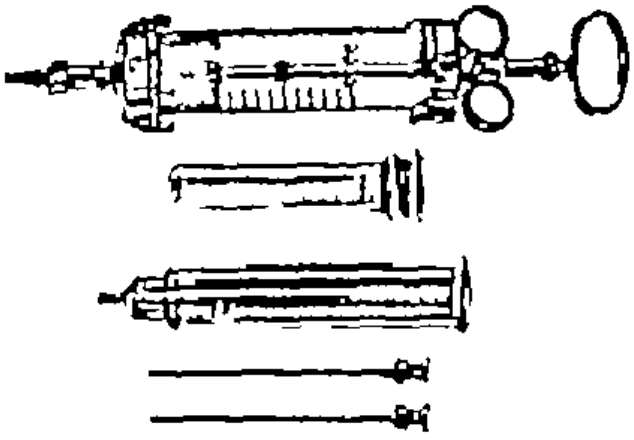
Case I. The patient M. G. H. years old was referred to me by Dr. M. Kenyon of Lancaster, Ohio, on April 9, 1913. In October 1912 patient noticed lump in his right cheek causing shooting pain in the right temporal fossa. No trouble in chewing or swallowing. No soreness. An unsuccessful attempt to remove this tumor was made by another surgeon in January 1913.

When I saw the patient in April, I found in the right cheek, below the zygomatic bone, tumor located outside of the buccinator muscle. It was about the size of a walnut, had sharp borders, as lobulated, firm in consistency painless to pressure and not adherent to the skin. A digital examination, one finger in the mouth and the other outside showed that the tumor had an upward prolongation which disappeared under the zygomatic bone. The latter one on the right side was more prominent than on the left side. There seemed to be slight paretic condition in the region of the facial nerve, although there was no paralysis. Tonsils and adenoids were very much enlarged. The right posterior choana was filled with mass, red bluish in color and bleeding extremely easily when touched with an instrument. I made the diagnosis of myxofibromatous polypus and concluded that this tumor in the cheek was only an extension of the same tumor passing through the pterygomaxillary opening. I referred this case to Dr. John Edwin Brown, ear and nose specialist, who very successfully and skilfully removed the polypus by the external route. The operation was extremely bloody, difficult, and lasted an hour. At the end of the operation the patient was more or less exsanguinated. Pupils were dilated, pulse could not be felt. Patient seemed to be in imminent danger of death. Very quickly I made an indirect transfusion to the patient of one and one-half ounces of citrated blood taken from the father and injected quart of salt solution intravenously. The blood transfusion did not last more than five minutes. The boy recuperated gradually, his pulse although extremely rapid, became palpable, three hours after his haemoglobin was 55 per cent. In the latter unfortunately haemoglobin had not been taken before transfusion. Gradually the boy's strength came back and he made an uneventful recovery. The macroscopical examination confirmed the diagnosis of myxofibroma.

Case II. Mrs. M. P. 30 years of age was referred to me by Dr. H. M. Beebe, Sidney, Ohio. The patient had goiter examination of both showed it to involve both lobes and the isthmus of the thyroid the lower pole of the right lobe dipping behind the clavicle and the sternum. In addition to this intrathoracic character of the goiter the patient showed some symptoms of thyroid intoxication so she entered the hospital was put to bed and preparatory treatment of several days carried out.

She came to operation in apparently good condition, although the pulse was still rapid. Morphine-scopolamine ether anesthetic. The right upper pole was ligated and the right lobe and the isthmus resected. The amount of haemorrhage was only moderate but the operation offered some difficulty on account of the intrathoracic portion of the goiter. The patient woke up on the operating table, her pulse this time being rapid and full, but her color was good and no signs of collapse apparent. Four or five hours after her heart suddenly collapsed and despite all treatment including an indirect transfusion of 75 cmm of blood from the husband the patient died. Respiration continued for some time after the heart had ceased beating. This case was typical case of heart failure.

The technique of the indirect transfusion in this case was identical to that used in Case I but

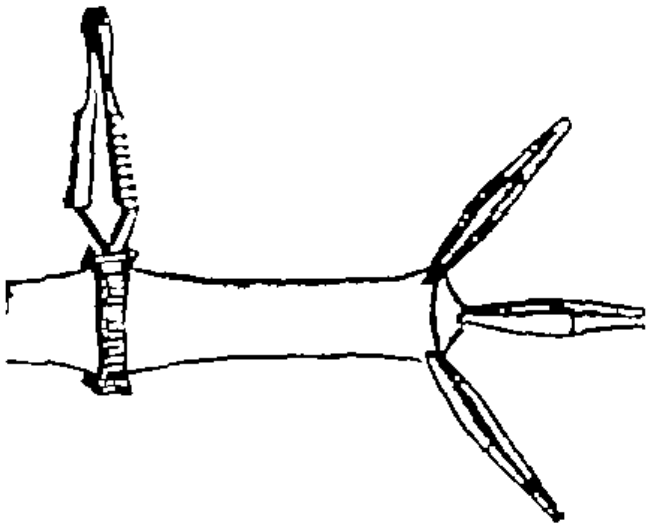


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the indications for the procedure in Case 1 became apparent in the operating room where it could be carried out without any appreciable loss of time while in Case the collapse occurred several hours after the operation, in the patient's room, and some considerable time was necessary to prepare sterilize etc before proceeding The patient in the second case was beyond aid although the actual elapsed time for the indirect transfusion itself was slightly more than five minutes

Technique Iodine preparation of the skin of the donor Local anesthesia with novocaine one per cent Incision of the skin three or four cem long in the angle of the elbow The cephalic vein is dissected out and cut at the upper end





Mosquito forceps and artery clamp applied to vein

of the incision The proximal end is ligated with catgut To the distal end three small mosquito forceps are applied at equal distance one from the other in order to maintain the lumen of the vein open (See illustration) A small artery clamp applied a few centimeters below prevents the blood from leaking

The same operation is performed on the recipient with the difference that the vein is ligated at the lower end of the incision

A blunt needle which has been adapted to a syringe is introduced into the vein of the donor in the opposite direction of the blood current, blood is aspirated into the syringe and reinjected into the vein of the recipient, in the same direction as the blood current

The transfusion can be repeated as often as is deemed necessary without coagulation provided needle and syringe are freshly washed each time in a warm normal salt solution The best plan is to have two needles and two syringes and to have one set washed by an assistant while the other is in use When transfusion is terminated, the veins are ligated and the skin incision closed By this method any amount of blood can be transfused safely from one patient to another and the exact amount of blood transfused is known The fact that the blood is venous seems to be without importance My first case would seem to prove that it is not necessary to transfuse large quantities of blood to save a patient However it can be done if deemed necessary The technique is simplicity itself and can be used by anyone A few bubbles of air are of no importance

THE MATHEMATICAL CALCULATION OF PROGNOSIS IN FRACTURES AT THE ANKLE AND WRIST

E. H. SKINNER, M.D., F.A.C.S., City Missouri

THE prolific use of the X-ray has forced surgical attention to the anatomical reduction of fractures. Anatomical reduction is a worthy ambition but our appreciation of functional reduction has been obtunded thereby. I desire to show you that less attention to fragments need be displayed if the joint surfaces are in correct relation and the lines of weight-bearing force are functionally satisfactory. In my attempt to reduce to mathematical exactness the relation of certain weight-bearing surfaces, I present for your consideration certain studies upon two of the commonest joint injuries, i.e. fractures at the ankle and fractures at the wrist. My work upon the shoulder and hip is not as yet crystallized into simple estimations.

These studies have been pursued with the idea of bringing this method of prognosis within the reach of the physician outside of the larger cities and where the X-ray apparatus may be of small capacity. The mathematical diagrams herewith presented may be applied to any such negative if the directions regarding the position of the parts are followed.

FRACTURES AT THE ANKLE

Axiom.—The functional result of an ankle fracture depends upon the proper reduction of the astragalus so that the line of weight-bearing force which passes through the center of the tibia also passes through the astragalus at its center.

Directions for exposures of the ankle. The illustrations which serve to amplify this article are reductions from 5 x 7 inch plates. The X-ray exposures are always made with the leg resting upon the long surface of a right angle frame and the foot is supported by an Esmarch bandage or heavy rubber bands against the right-angled foot piece. The X-ray tube is centered, in the adult, on inch above the center of a line connecting the external and internal malleolus. An exposure with even the crudest apparatus will give a nega-



Fig. 1



Fig. 2



Fig. 3

Fig. 1.—Normal ankle joint taken in the anteroposterior position and showing the line drawn through the center of the tibial shaft will pass through the center of the astragalus. Note the normal apposition of the astragalus under the tibia.

Fig. 2.—An old fracture of the ankle with extreme displacement of the astragalus. Note the relation of the astragalus to the line through the tibia. The weight of the body in walking is carried by the foot by the shaft of the tibia and if the astragalus is not centered under the tibia, there is more or less pain and discomfort in walking.

Fig. 3.—An old fracture of the ankle. It will be noted that the ankle mortise is broader than normal and the astragalus is not centered under the tibia as the space between the astragalus and the internal malleolus indicates. The line down the center of the tibia shows that there is more of the astragalus external to the line than is the normal ankle.

tive upon which the line of weight-bearing force may be charted.

A line drawn through the center of the shadow of the tibia extends through the center of the shadow of the astragalus. This line may be charted upon the anteroposterior X ray negative by applying a line to the center of the tibial shaft shadow and extending it downward through the shadow of the astragalus. This vertical line should always extend through the center of the astragalus if the ankle joint is in normal position.

The charting of this described line of weight bearing force may be made upon the finished negative by means of any straight edge preferably a celluloid rule.

The interpretation of the plate depends not so much upon the shadow of the lines of fracture as upon the shadows of the relative position of the tibia and astragalus. One must judge of the injury by the position of the astragalus. The anteroposterior position negative gives us the information regarding the mortise between the astragalus and tibia.

To judge the normal or abnormal relationship of the tibio-astragaloid articulation we must realize that the head of the astragalus is firmly mortised between the lower end of the fibula and the internal malleolus, and is directly beneath the broad articulating and weight-bearing surface of the tibia. This gives only sufficient room between the internal lateral border of the head of the astragalus and the tibia for some ligaments and the action of the joint. This space increases with the slightest torsion fracture of the fibular malleolus for it is due entirely to the integrity of the lower end of the fibula that the astragalus remains mortised correctly.

Provided we have established by the X ray, the diagnosis of a torsion fracture of the lower end of the fibula we are at once interested in methods of reduction and fixation which will promote a functionating ankle as a result. Examination of



Fig. 4



Fig. 5

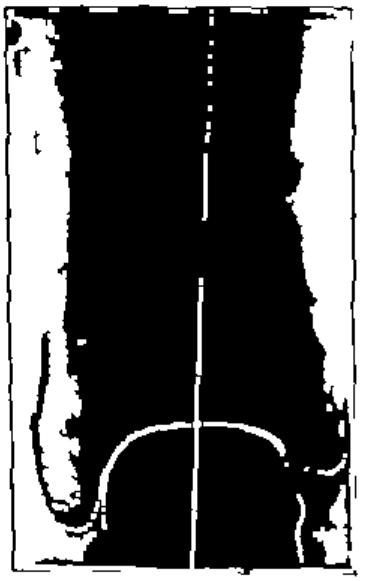


Fig. 6



Fig. 7

Fig. 4. Pott's fracture of the ankle. Taken after attempted reduction. More than three-fourths of the astragalus is external to the plotted line indicating that further reduction is necessary.

Fig. 5. Fracture of the lower end of the fibula after reduction. It will be noted that the anatomical reduction of the fibula appears to be very good but the position of the astragalus is not satisfactory and if the ankle were left in this position there would be an abnormal line of weight bearing force. This illustrates the necessity of interpreting the X ray negative with regard to the functional prognosis rather than to the anatomical position of the fragments of fracture.

Fig. 6. Fracture of the lower end of the fibula without perfect anatomical reduction of the fragments but with very good reduction of the astragalus. This case made good recovery.

Fig. 7. Illustrating the plotting of lines upon the posteroanterior negative of the wrist. The internally extended hand the long axis of the radius usually passes through the interval between the second and third metacarpal bones, but this may be a trifle altered if the hand is cramped or influenced by bandages. Note that the styloid of the radius is entered distal to the horizontal line which is at right angles to the long axis of the radius and just touches the tip of the ulnar styloid.

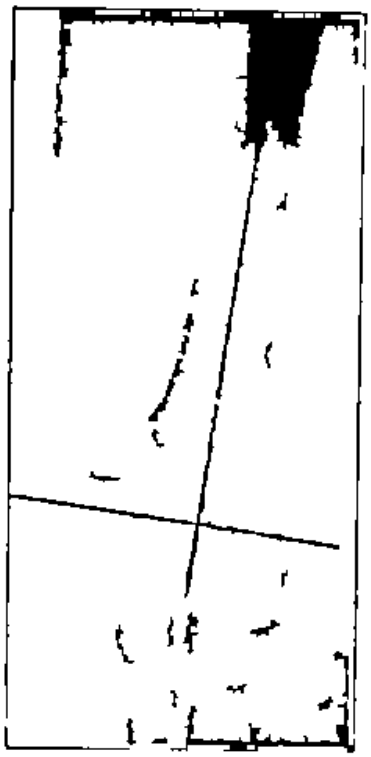


Fig. 8

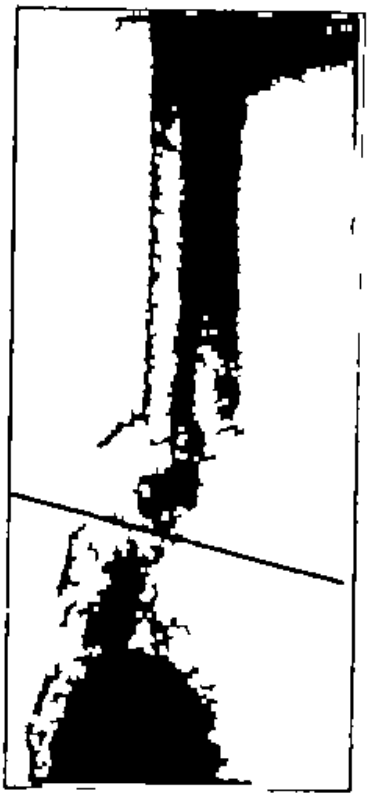


Fig. 9



Fig.



Fig.

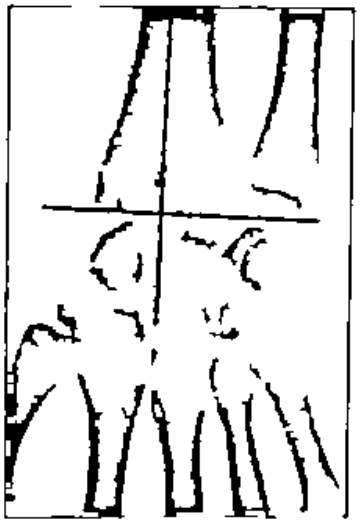


Fig.



Fig. 3



Fig. 4

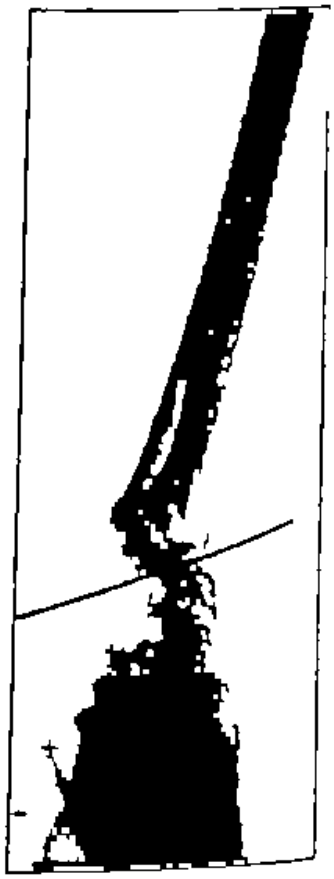


Fig. 5

For legends, see p. 24

a large number of results of ankle fractures, both in hospital and private practice, has taught me that the proper treatment of these cases is extremely difficult. True, the fracture is a slight and simple affair but the broad, painful ankle that so frequently results merits our attention to details.

The secret of the correction of this fracture lies in the proper adaptation of the astragalus to the tibia. The weight-bearing line of the tibia is transmitted to the foot by way of the articulating surfaces of the tibia and astragalus. It is essential that this relationship be maintained to insure a useful ankle-joint. For years we have enjoyed an epigram something like this "Take care of the tibia, as it bears the weight of the body the fibula has no function and will take care of itself." In contrast I would advocate Reduce the astragalus and avoid painful ankles. And to properly reduce the astragalus requires attention to the fibula, for by the lower end of the fibula alone is the astragalus properly adapted to the weight bearing tibia.

Now we know that the integrity of the ankle depends upon how well the low end of the fibula performs this mortising function. The large majority of ankle fractures and chronic ankle sprains are fractures of the external malleolus. It frequently happens that the position of the fragment in a fracture of the external malleolus is in apparently good position but the mortise of the ankle-joint is sprung open by the slight outward displacement of the fibular fragment. Conversely we may have a poor alignment of the fracture but a splendid reduction of the astragalus. It is therefore, unnecessary to pursue futile manipulations of the fibular fragment if the astragalus is in correct alignment.

One will readily see that the slightest displacement of the astragalus, externally presents a widened ankle space, and if this is not corrected the patient will ever after have an abnormal line of weight-bearing force. In some cases the ankle may adapt itself to the new position but a little attention to the position of the toes will avoid many painful and weak ankles of tardy convalescence. A good motto for the surgical attendant should be Watch the toes turn the toes in."

It does not matter what the form of fracture at the ankle, whether simple or serious for if the anteroposterior X-ray negative shows the astragalus centered under the tibia, the prognosis of a functional result will be more favorable than any anatomical alignment of fragments.

FRACTURES AT THE WRIST

Axiom.— The entire styloid process of the lower end of the radius is constantly distal to a line which touches the lip of the ulnar styloid which line is at a right angle to the longitudinal axis of the radius. The functional result of fractures of the lower end of the radius depends upon the reduction of the radial styloid to this position.

Method of X-ray exposure of the wrist. The difficulty in obtaining and interpreting lateral views of the wrist has led to this charting of the wrist joint upon a single postero-anterior X-ray exposure. The affected wrist and hand are placed with the palmar surface upon a 5 x 7 inch X ray plate with the one end of the plate at the web of the thumb The tube is centered over a point midway between the styloid processes of the radius and ulna. The resulting plate provides shadows of the proximal portions of the metacarpals, the carpus and about three inches of the lower end of the radius and ulna.

Fig 8 Fractured radius. Note that the styloid of the radius is proximal to the cross line indicating a backward and upward displacement of the radial head The long axis of the radius now passes down between the third and fourth metacarpal bones, owing to the rotation of the hand and carpal area with the displaced radial head

Fig 9. Lateral view of the same case as Fig 8 This is shown to prove the interpretation made under Fig 8, and to show the direction of the joint surface of the lower end of the radius when there is backward and upward displacement Normally the joint surface of the lower end of the radius exhibits the dorsal edge distal to the palmar edge, but when there is any displacement backward and upward it exhibits just the opposite which is here illustrated See Fig for normal position

Fig Fractured lower end of the radius reduced This is the same case as Fig 8 after reduction, and while in plaster cast Note that we now have the normal plotting of the two lines, and the styloid of the radius is distal to the cross line.

Fig 2 Lateral view of Fig 10, showing the head of the radius reduced and the joint surface of the radius in normal position Compare this with Fig 9 This is the normal position of the joint surface of the lower end of the radius with the dorsal edge distal to the palmar edge

Fig Separation of the lower end of the radius at the epiphyses with backward and upward displacement. Note that the radial styloid is proximal to the cross line, which may be interpreted as indicating the displacement of the lower end of the radius

Fig 5 Lateral view of Fig which proves the interpretation of Fig Note the abnormal position of the joint surface of the lower end of the radius

Fig 4 Fracture of the lower end of the radius with displacement of the radial head backward and upward as indicated by the position of the radial styloid in relation to the cross line.

Fig 5 Lateral view of Fig 14, proving the interpretation and indicating the abnormal position of the joint surface of the lower end of the radius

Anatomical considerations In the antero-posterior radiograph of the normal wrist, a line drawn through the center of the long axis of the radial shaft shadow passes between the proximal epiphyses of the second and third metacarpal bones. In backward displacements of the fractured lower end of the radius the radial rotation of the carpal area and metacarpals usually bring this line between the third and fourth metacarpals. But this single line is not sufficient to judge the radial position from the single postero-anterior X-ray negative. So we must add the line at right angles to this longitudinal axis of the radius at a point corresponding to the tip of the ulnar styloid. If the styloid of the fractured lower end of the radius is behind this transverse line, it is not properly reduced and if left in this position will remain a functionally imperfect wrist.

It does not matter what the nature of the fracture at the lower end of the radius, whether it be an epiphyseal separation in youth or a comminuted fracture of the aged, if the reduced lower end of the radius provides the above normal charting, one may be fairly sure of the functional result.

The functional result depends upon the proper adaptation of the carpal articulating surface of the radius. The articulating surface of the normal radius with the carpus is tilted so that the dorsal edge of the lower end of the radius is always distal to the palmar edge. The correct position of the radial styloid according to the above charting necessitates the normal anatomical position of this articulating surface.

Many writers have described the dropping of the ulna, or the separation of the ulna, as the cause of bad results in Colles's fracture. But these objective findings usually depend upon the tilting backward of the radial articulating surface at the wrist. Furthermore, it does not matter if the apposition of the fragments is faulty in contour if the extension is sufficient to replace the articulating surface to its normal weight-bearing position

It is the tilting backward of the lower end of the radius that interferes with the function at the wrist, and this can only be overcome by the full extension of the fragment and the consequent normal position of the articulating surface of the radius.

This charting has been applied to X-ray negatives of all varieties of fractures at the lower end of the radius with satisfactory results. Do not try to straighten out the hand where the wrist is fractured, but let it assume a comfortable position Any unnatural change in the position of the hand alters the relation of the metacarpals to the longitudinal axis of the radius, the first line of our calculations but such a change in the metacarpal position does not in the least alter the plotting of the position of the radial styloid with relation to the second line which is transverse to the first line and just touches the tip of the ulnar styloid.

If the entire styloid process of the lower end of the radius is distal to the transverse line at the ulnar styloid process, it implies that the articulating surface of the radius with the carpus is in a correct position for a good functional result.

Nature is wonderfully tolerant of fragments if she can maintain her functional joint surfaces.

CASE OF PERNICIOUS ANÆMIA TREATED BY SPLENECTOMY MARKED IMPROVEMENT

By W. S. HARPOLE, M. D. and CHARLES M. FOX, M. D. Chicago

WE desire to report this case thus early because the results are sufficiently suggestive to warrant further operation in this fatal disease. The case was operated in ignorance of the five German cases that have been reported since August, 1913.

The reasons for operating were the following: (1) A case of pernicious anæmia steadily going from bad to worse under the usual medical treatment. (2) The presence of an easily palpable spleen which could not be accounted for by previous malaria or other disease. The enlargement of the spleen suggested the possibility of an hypertrophy due to overactivity of the organ, the possibility that the spleen was perniciously active in a function generally accredited to it, namely the destruction of red cells. The case has improved since the operation, as have the five German cases, some of which are reported as completely healed. The phenomenon of a great increase of nucleated red cells after the removal of the spleen corresponds to the other cases reported. The color index has fallen ever since the operation.

The patient received a back-set sixty days after the splenectomy, by having an appendicitis with ruptured appendix and somewhat diffuse peritonitis, which was treated by appendectomy and drainage from which he made a rather slow recovery. At present he is up and about, feeling fine and gaining in health and strength. The history is as follows:

J. D. B., aged 40, comes from Iowa; characteristic appearance for pernicious anæmia. Moderate spinal changes. Gives history of loss of right and strength for two years. Had lost much weight in the few months before coming to Chicago, because he had been given vegetarian diet, to correct the possible auto-intoxication. The blood showed, July 14, 1913 (counted by the Columbus Laboratory): Hæmoglobin, 40 per cent.; reds, 1,700,000; whites, 1600 poikilocytes, nucleated reds and normoblasts. Color index, .6.

Treatment ordered: Sodium cacodylate gm. .1 hypodermatically every other day. Large doses of hydrochloric acid after meals. Full diet, with large quantity of meat. The count on August 29, 1913: Hæmoglobin, 37 per cent.; red cells, 1,150,000; whites, 5000. Index .60.

The patient was operated upon September 8, 1913. He was given gas-ether. Incision through outer border of left rectus. Spleen delivered after breaking up a few adhesions to diaphragm. Gastro-enterostomy clamp was put on pedicle. The vessels of the pedicle were markedly atheromatous, so much so that the soft clamp ruptured one or two good-sized arteries. The pedicle was doubly ligated and the wound closed. The spleen weighed twice the normal, was firmer than normal. A number of small millet-sized nodules showed on the surface. The cut surface showed a few of these same nodules scattered through the splenic pulp. Microscopically there was an increase of connective-tissue elements and decrease in lymphoid structures, also some hyaline degeneration in the blood-vessels. The nodules already mentioned were of connective tissue. The blood-vessels of the spleen were increased in number. The diagnosis of the pathologist was chronic splenitis. Following the operation the patient ran temperature of about 101° F. for three weeks. This gradually returned to normal. The patient's lemon-yellow color disappeared in ten days. The œdema of face and ankles left in two weeks and has not returned. The drowsiness that the patient had always experienced disappeared three days after the operation. The patient rapidly gained strength and got out of bed on the eighth day, walked about in two weeks, and left the hospital October 5th. The blood counts after operation were: September 10th, two days after operation: Reds, 960,000; hæmoglobin, 80 per cent.; whites, 23,000; index, .4. September 14th: Reds, 700,000; hæmoglobin, 3 per cent.; whites, 18,000. September 18th: Reds, 2,200,000; hæmoglobin, 55 per cent.; whites, 14,000. September 30th: Reds, 1,400,000; hæmoglobin, 50 per cent.; whites, 4,000. September 28th: Reds, 1,184,000; hæmoglobin, 35 per cent.; whites, 1,000. October 3d: Reds, 760,000; hæmoglobin, 40 per cent.; whites, 9400; index, 1.07. November 6th: Reds, 1,068,000; hæmoglobin, 45 per cent.; whites, 8,000.

On November 7th the patient was operated for appendicitis, whose presence as possibly indicated by the high leucocyte count of the day before, although he did not complain of symptoms of it until on his way home from the laboratory where the count was made. After the operation for appendicitis the blood rapidly fell off, but soon began to recover. The counts are: November 9th: Reds, 1,440,000; whites, 8,000. November 11th: Reds, 1,320,000. November 17th: Reds, 1,420,000. December 18th: Reds, 3,320,000; whites, 2,000; hæmoglobin, 50 per cent.

Ever since the splenectomy the blood has shown great number of normoblasts, many more than before the operation. The patient has gone on trip to the southern part of Illinois, feeling fine, gaining strength rapidly, having color not noticeably different from the normal.

THE EXTRAPERITONEAL CÆSAREAN SECTION

Its Place in Obstetrics

By WILLIAM R. NICHOLSON A. B., M. D. Philadelphia

IT is an interesting fact that the operation known to-day as the extraperitoneal supra symphyseal cæsarean section originated in the minds of practical obstetricians more than one hundred years ago. The first man to propose the procedure was Jorg, who in 1806 advocated an intervention in impossible labor which was based upon the observations of many accoucheurs, among whom Boer of Vienna is mentioned, that after the rupture of the upper part of the vagina and lower uterine segment, the fœtus may be found in the abdominal cavity. At that time the classical operation was practically fatal, Blundell, in his 'Principles and Practice of Obstetrics,' published in 1834, gives a list of twenty three cases, the only ones performed in England before the year 1821 with fatal results in all except one. This successful case was operated by Barlow in 1793. As late as the year 1866 *Playfair stated before the Obstetrical* Society of London that the mortality was 89 per cent, and in 1883 Greenhalgh, of Saint Bartholomew's Hospital, could only report one successful case among the ten operated by him.

From the earliest times of which we have record it had been understood that entrance to the peritoneal cavity was accompanied by the most serious risks, and though the real reason was not understood, the operators were more or less close to the truth. Thus Jorg, in his text-book published in 820, says that the classical operation is fatal in 95 per cent of all cases because of the entrance of air into the peritoneal cavity. In 1860 Nelaton could find no successful case operated in Paris within sixty years, and it is a fact that from 787 there was no successful case in that city until the year 1879, when Tarnier performed his first Porro operation. The conditions in Vienna during this period were identical, according to Spath, who states that up to the year 1877 there is no record of a successful case in that city. Before 881 from 64 per cent to 85 per cent died in the best German clinics. It is hardly to be wondered that obstetricians came to the conclusion that not only must the attempt be made to decrease this high mortality but that the only method was by the avoidance of the peritoneal cavity. One of the men thus impressed was Ritgen, who refers to Mothe of Paris as advocating a procedure practically identical with the Duhrssen vaginal section. In 1821 Ritgen performed the Jorg operation in a slightly modified form but with a fatal result, encountering such severe bleeding that he was forced to complete the operation by the classical method.

It is a pleasure to find that only a few years later eminent American physicians were also concerned with this same question. In the year 1824 Physick proposed to Dewees that the approach to the uterus be made extraperitoneal. This advice is quoted in the text-book of the latter published in Philadelphia in 1826, and was founded upon anatomical studies of Drs. Horner and Physick. While this operation was never performed, it is recognized by Latulo as being practically identical with the technique known to-day by Sellheim's name. Shortly before this time Baudelocque the younger suggested gastro-elytrotomy. He made two attempts to follow the technique of Ritgen, in the first instance being compelled to desist because of severe vaginal bleeding while in the second he injured the external iliac and was forced to tie the common iliac artery.

From this time there seems to have been a cessation of activity regarding the matter until the year 1870, when Thomas performed the operation of laparo-elytrotomy. His method was as follows: manual dilatation of the cervix followed by an incision from the symphysis to the anterior superior spine of the ilium. He then dissected down to the peritoneum, which was separated and pushed upward. The cervix and vaginal wall were then exposed and the latter incised upon a sound introduced into the vagina as a guide. The cervix was now drawn through the wound in the vaginal wall into the external wound in the abdominal wall and the child delivered. By this method Thomas performed two operations, the first upon an eclamptic with a fatal result, while the second, in the case of a young primipara with contracted pelvis, was a success. In 876 Skene had the pleasure of saving two women by this method, and in 1878 the American Gynecological Society sanctioned the operation and gave it the name laparo-elytrotomy. Up to the present time there have

been fourteen of these operations reported two each by Thomas, Duncan and Jewett, while Skene had five and Gillette Hime and Edis each one. The mortality of these cases was 50 per cent for the mothers and 42 per cent for the children and it is to be remembered that the histories show the majority to have been in so serious a condition that they would have been very bad risks under any plan of treatment. The bladder was wounded in six instances, and the risk of this accident and the general technical difficulty of the procedure caused a halt in its performance, together with the fact that the introduction of asepsis rendered it an unjustifiable operation. It may be stated, however, that in competent hands, at the present day it should not have a greater mortality than the recently devised Duhrssen-Solms technique.

In preparation for this study I sent out a number of letters to well-known operators in the United States, asking for their experience with and their opinion concerning the present-day extraperitoneal cæsarean and among the letters in reply I received one from Dr G K Dickinson of Jersey City which was of so much interest to me that I incorporate it here since it adds another unpublished case to the list of laparo-elytrotomies and gives a most vivid picture of the obstetrical situation of thirty years ago.

In reply to your letter of yesterday I would say that the only operation of that kind with which I was associated occurred so long ago that the notes are meagre and my recollection perhaps, not altogether correct, although very vivid. Dr J J VanVorst and myself were the surgeons Dr W F Watson and some others were assistants The neighbors were aroused, and vengeance was to be meted out to us if we attempted anything The woman was not consulted. Her husband was tentatively agreeable to have something done Her history was of several confinements, craniotomies an agonizing time and no result Dr VanVorst and myself feared the outcome of this case and were very much impressed by an article which appeared at that time termed laparo-elytrotomy I can remember that we congregated in Dr VanVorst's office then when a messenger was sent, we went around the corner and stood behind the trees with our satchels awaiting the signal The signal being given we went into the house. It was one of those dark dirty tenements and the last place in the world to do this kind of a job. The woman had been in labor several days. The pelvis was narrow cervix well dilated and soft secretions were abundant and the pains came on at five-minute intervals. She was considerably exhausted from a long period of ineffective labor We put her to sleep, washed her up used the carbolic of the day and made an incision on the right side above Poupart's ligament, cutting through all the structures. Coming down on the peritoneum we dissected it up until the vagina was reached. This was opened and the baby extracted. The baby died, also the mother This was done in a little room about twelve feet square, with one window The curtain had to be drawn on account of fear of the public. If I remember correctly the woman lived through the following night, but succumbed the next morning from exhaustion, perhaps beginning sepsis. I remember there was some bleeding but not very abundant. What there was we easily controlled by packing The difficulty was in stripping up the peritoneum and reaching the vagina. Surgery in those days being novelties to the most accomplished, and particularly to us, the local conditions and the psychology of it all rendered the operation more than usually disturbing So far as I can bring my memory back there is no other incident of importance connected with this case

Between the years 1891 and 1896 the mortality of the classical cæsarean section may be estimated as about 38 per cent, in the year 1901 it had fallen to 20 per cent and in 1904 it reached the low water mark 12 per cent. This wonderful reduction in mortality was, of course, in greatest measure due to the improvement in technique rendered possible by the introduction of asepsis, but it is always to be remembered that it was also to some extent the result of a better selection of cases, it having been early appreciated that the seriously infected parturient was no fit subject for the procedure. As time went on and better statistics became available it was still more definitely recognized that unless something more was to be added to the equipment of the obstetrician the operation of craniotomy must still be called upon in not infrequent cases, since the mortality of 8 per cent in general practice for this operation is far better than a percentage of 34.3 per cent, which can be shown by statistics to be about what may be expected in a series of cases subjected to the classical operation, after frequent attempts at delivery or repeated examinations have been made by unskilled attendants. The only other alternatives were the much vaunted publiotomy, hysterectomy either with the extraperitoneal treatment of the stump, or else the so-called cæsarean hysterectomy and no one of these

operations satisfied the requirements, since pubiotomy was found to be a dangerous procedure in neglected cases from the standpoint of maternal sepsis, while the child had to undergo the ordeal of pelvic delivery at a time when, weakened by the previous traumatisms of labor or human endeavor it was illy conditioned to withstand any added insults. The removal of the uterus, although giving a better percentage of maternal results than the classical operation in the presence of severe sepsis, could not be considered ideal, if for no other reason than the destruction of the power of reproduction. In fact it was felt that it was a wiser procedure to perforate, and by thus destroying a child, often beyond resuscitation to save the life of the mother for future childbearing

Such were the reasons for the proposition, first made by Frank of Cologne in 1907 to perform the operation of cesarean section extraperitoneally and above the pelvic brim. That there was a real demand for some improvement which would enable the profession to cope with the seriously infected case is evidenced by the enthusiastic diligence of Frank's German colleagues in perfecting and modifying the original technique There are in the neighborhood of twenty operations now on record for the attainment of the suprasymphyseal extraperitoneal delivery While in many of them the differences may seem unimportant, to the investigator far removed from the sounds of battle it is necessary for the full understanding of the subject, that a short résumé should be incorporated here, though among the number there are certain performances which can only appeal to the surgical contortionist.

The anatomical facts upon which all these operations are dependent are, first and most important, the distention of the lower uterine segment secondly the migration of the peritoneum during pregnancy whereby the bladder is more or less deprived of peritoneum and becomes in late labor uncovered by the peritoneum above and in front, thirdly the growth of the peritoneum due to the hypertrophy of pregnancy and, finally the loosening of the peritoneal reflection over the lower uterine segment, which, as is so well shown in vaginal cesarean operations, enables it to be separated from the uterine wall with the greatest ease

As early as the year 1908, Holzapfel was able to enumerate sixteen different methods for the performance of the suprasymphyseal extraperitoneal cesarean section and since that time there have been several further modifications, but these, with the exception of the Dührssen-Solms technique, are of little importance. The last mentioned operation is unique and will be mentioned later

Frank of Cologne was the first man in recent times to propose the extraperitoneal method, and therefore the classification of these various procedures is headed by his method, which was as follows The abdominal wall was opened by a Pfannenstiel incision, and the parietal peritoneum was incised transversely as was also the uterine the latter was then separated from the anterior face of the uterus and joined by stitching to the parietal peritoneal leaflet, finally the uterus was incised transversely This method is known as Frank's first technique and is in reality a transperitoneal operation. His second method attempts to fulfill the aim of true extraperitoneal attack and was performed as follows After incision of the abdominal wall as in the former method, a small opening is made in the parietal peritoneum for the orientation of the bladder and this organ is freed from its peritoneal coat by blunt dissection, or where needful, by a few cuts of the scissors the incision into the parietal peritoneum is then closed and the uterus is opened as in the former method.

The Veit Fromme original technique is identical with Frank's first method except that after the uterus has been closed the peritoneal flaps are again separated from one another and united as before operation As a modification of this technique the same authors have presented the following, which is in our opinion the best of all the manifold methods by which this operation may be performed the abdominal wall is incised longitudinally as is also the peritoneum, both parietal and visceral, these two layers of peritoneum are then brought into apposition by clamps, and after the delivery has been accomplished through a median longitudinal incision into the lower segment, the peritoneal flaps are reunited in their original relations.

One of the earliest to enthusiastically adopt the idea of Frank and Veit was Sellheim, and he has published four different modes of procedure His first method is true extraperitoneal technique Pfannenstiel incision through the skin and fascia, separation of the recti longitudinally separation of the subperitoneal tissue from the under surface of the recti, distention of the bladder with solution t and in its orientation loosening of the peritoneum from the top of the bladder and finally the upward displacement of the unopened sac of peritoneum with coincident downward displacement of the bladder below the symphysis

The uterine incision is made in the middle line of the lower segment and is vertical. In his second method the technique is as just detailed until the parietal peritoneum is reached this is incised transversely and through this incision the uterine peritoneum is similarly incised and the two flaps thus formed are united by stitches. The peritoneum is then pushed up and the bladder is displaced downward. The only difference between the method just described and his third method is that in the latter the folds of peritoneum are united by a double layer of catgut stitches. Sellheim's fourth method, however is a wide departure from his previous three plans and is an attempt to treat all cases, of whatever grade of infective virulence by suprasymphyseal operation. It is known as the method by utero-abdominal fistula and is performed as follows Median incision through all abdominal layers, including the serosa of the lower segment. The parietal serosa is then stitched on the skin surface and the uterine serosa, after lateral separation from the uterine wall is stitched upon the parietal near the edge of the skin incision. A median incision is then made in the lower segment of the uterus, and the incised edges are drawn forward into the abdominal wound during the delivery After the birth has been completed the edges of the uterine wound are sutured to the skin surface. The orifice thus left is packed and allowed to heal by granulation.

Pfannenstiel advocates the incision known by his name through the skin and fascia with a longitudinal separation of the muscles, a longitudinal incision in the peritoneum, and a longitudinal incision in the lower segment of the uterus.

Baumm advises the same technique as Veit's first method, with the exception that he sees advantages in the clamping of the peritoneum instead of stitching it, during the delivery

Rubeska offers a method for badly infected cases He makes a median incision in the abdominal wall and stitches the parietal serosa around the area to be incised before opening the uterus The uterine wound is treated by the open method This is a similar procedure to Sellheim's fourth method.

Doederlein is a strong advocate of the true extraperitoneal technique and attempts it by an initial inguinal incision followed by dissection of the parametrial tissues without exposing the peritoneum. After reaching the lateral aspect of the lower segment the bladder is displaced laterally without separating the peritoneum from it, and the uterus is opened in the median line. Drainage is a part of his usual technique.

Cryzewicz prefers the median abdominal incision until the peritoneum is reached and then follows Sellheim's first method for the balance of the procedure

Hoffmeier in his earlier work followed the technique of Veit's second method, the only difference being a continuous seroserous suture, non-separation of the united flaps of peritoneum and the use of drainage. His second method simply consists in a median section through the abdominal wall and through the uterus as low as possible. One of the methods which seems to have attracted a large number of foreign operators is Latzko's. This operator fills the bladder with 150 ccm. of sterile solution and then makes a 12 cm. incision through the recti, which are laterally displaced. The bladder is then loosened from the lateral aspect of the cervix to a degree which permits a side displacemnt of the former with one rectus muscle the uterus is opened longitudinally and the uterine wound is drained.

Probably the most remarkable form of intervention is the procedure known as the Duhrssen-Solms technique. In this method the abdomen is opened by an incision parallel to Poupart's ligament and the tissues are separated by blunt dissection until the uterus is reached during this dissection the epigastric vessels must be ligated. A vaginal cæsarean is then performed and the wound in the uterus and the wound in the abdomen are brought into coincidence by traction the child being delivered above the symphysis.

A decided simplification of the above confusing array is made possible by classifying them on the basis of essential differences thus the Frank, Veit Fromme, Baumm, Pfannenstiel, Hoffmeier and the second method of Sellheim are all transperitoneal methods, their differences only consisting in various means of closing the peritoneal folds (parietal and visceral) and whether or not these same folds of peritoneum, which have been united for the moment, are again restored to their original anatomical relations before closing the abdomen. There are three other divisions by which all the other important methods may be classified, as follows the utero-abdominal fistula technique of Sellheim and Rubeska the true extraperitoneal technique of Sellheim and Latzko and finally the Duhrssen-Solms technique. While opinions among the continental operators differ widely as to the value of the various operative methods described, and while, of course, each creator of an individual method is enthusiastically in favor of his modification, it seems fairly clear to a non-prejudiced investigator that the Veit Fromme modification of the Frank operation

and the second Sellheim technique are the only methods which are truly surgical. Most of the other procedures, if not absolutely all of them are either *founded upon the principle of making the* operation as difficult as possible, or else the distinctive modification is of such a nature that suspicion is aroused that the author was anxious to drive a nail upon which he might hang his name.

Sellheim makes the objection to Latzko's method by lateral undermining that it is not suitable for all cases and to Doederlein's that *sufficient space is often not afforded for an ample* uterine incision, and that there may be therefore severe uterine lacerations produced by extension during extraction of the child.

In order that a definite foundation be established for the further consideration of the subject the Veit Fromme method and the second method of Sellheim will now be considered in detail.

Veit was one of the first to advocate the operation which is known as that of Frank. Fromme in 1908 reported eight cases from Veit's clinic, in the first four of which the technique was exactly that of Frank. In the fifth case the parietal and visceral peritoneum were *separated* after the birth of the child and were restored to their normal relations. In the remainder of the series the transverse section through the skin subjacent tissues and uterus was given up and in its place was substituted the *longitudinal* incision. This modification is performed as follows: the skin, fascia and recti muscles are separated vertically and a vertical incision is *made into the parietal peritoneum. The visceral* or uterine peritoneum is then incised vertically in the median line of the lower segment beginning at the lowest possible point of the vesico-uterine plica and extending upward to the point at which the peritoneum becomes intimately attached to the uterine wall. In advanced labor the lower segment has become so distended that a space of from 10 to 12 cm. is available for this incision. The *peritoneum of the* visceral layer is then mobilized somewhat laterally which is easily done by blunt dissection and then the two peritoneal flaps, visceral and parietal are either stitched or clamped. A vertical uterine incision is made into the lower segment and the child is delivered. The placenta may be delivered at once as in the classical operation, or it may be awaited and expressed by fundal pressure either before or after the uterine incision is closed. The uterus is best closed by a running stitch reinforced by a second one as in intestinal suture. The abdominal wound is closed by the layer method and no drainage is used. The chief advantage of this method, in the opinion of its originator is that the bladder is not disturbed. (There is one *distinct disadvantage in this technique however* in that there may be difficulty in obtaining ample space for the uterine incision if performed during the early stages of labor. It is well to remember also that the fear of bladder necrosis from separation is in all probability not well founded.)

In Sellheim's original operative procedure he made the attempt to separate the bladder from the peritoneal fold without opening the latter and then by upward displacement of the unopened peritoneum and downward displacement of the bladder to obtain enough space to deliver the child. It was soon found, however that not only was it impossible in many cases, to avoid opening the peritoneum but that the bladder was liable to injury by the attempts at separating the peritoneum unopened. This method has, therefore, been very generally given up, and he has substituted the following, which is in reality not a true extraperitoneal but rather should be designated as a transperitoneal method. He operates under scopolamine morphine twilight sleep, with *spinal anesthesia*. The high Trendelenburg position is used and at present the incision is made in the longitudinal direction instead of the Pfannenstiel which was the case in his earlier works. The fascia and recti muscles are separated vertically and the peritoneum is separated from the under surface of the recti to consider-

able distance on each side along the upper border of the empty bladder. The peritoneum is now *opened at the attachment of the uraches* to the bladder. The incision in the peritoneum is prolonged to left and right along the firm attachment of the peritoneum to the bladder curving the incision laterally and posteriorly on both sides toward the floor of the vesico-uterine fold, while the bladder is drawn forcibly forward. A transverse incision is now made at the boundary between the loosely attached peritoneum in the vesico-uterine fold and the firmly attached bladder peritoneum. This transverse incision is prolonged on both sides into those portions of the anterior delimiting incisions which curve toward the side and back. The delimiting incision begins at the portion of the bladder peritoneum which remains undisturbed. The visceral layer of the peritoneum is now dissected away from the uterus in an upward direction as far as possible. The two leaves of peritoneum, the parietal and the visceral are now united by suture of their free edges, and care must be exercised here to avoid incomplete closure of either extremity of

the transverse incisions In other words, it is necessary to completely close the peritoneal cavity by suturing the peritoneal leaflets well out onto the broad ligaments if necessary not only to avoid contaminating the peritoneum but also to avoid the possibility of omental or intestinal strangulation. The bladder is now separated from the cervix and drawn forward over the symphysis and pressed against it. (It is better to allow the bladder to drop down behind the symphysis after its separation from the cervix and to retain it there by a suitable retractor) The anterior face of the lower segment being thus prepared, the incision is made in the median line in a vertical direction. Primarily but about 5 cm are incised, beginning at a point about 4 cm. below the upward displaced peritoneal fold. The tip of the special lever devised by the author for the delivery of the head, is introduced into this slit by the aid of lateral stretching and adapted to the head while at the same time the lower angle of the wound, which is constantly stretching and becoming more accessible, is incised as far as is necessary to allow the full application of the instrument The head is now raised from its bed and pried forward, and one pole of the presenting part is seized. The artificial cervi (uterine wound) is continued downward as far as needful for the passage of the entire head. The child is delivered, and the initial sutures passed at the upper and lower angles of the uterine wound The peritoneal suture line is now carefully inspected and then the placenta is delivered manually and a uterine tamponade inserted its lower end being led into the vagina. The uterine wound is closed by interrupted sutures, and this suture line is reinforced by a continuous catgut stitch with the exception of a small space at the lower angle of the wound, which is left open in order to have a safety valve through which one may later reopen from the agina, if there be need.

If at the time of delivery there be infection present, a strip of gauze may be carried through the lower angle of the wound into the agina and the abdominal wound be drained by a Mikulicz. If the case be clean one the peritoneal reflection may be attached to the bladder and secured with a few interrupted sutures to the lower portion of the rectus muscle The abdominal wound is closed by continuous suture of catgut in the muscles and fascia and any skin method which is desired.

In this multiplicity of operative technique there is, as has been said, one salient difference which divides them all nt two great groups, namely whether or not the general peritoneal cavity is opened in the preparation of the lower segment for incision or in other words, whether the operation is performed in a truly extraperitoneal manner by lateral displacement of the bladder vesical plica, and unopened peritoneal sac, or whether in the performance the abdominal cavity is temporarily opened. It goes without saying that, technically extraperitoneal section means extraperitoneal section, a procedure carried out from start to finish without entering the true cavity of the belly and this would be the ideal method but for two facts which render its use less favorable first, that it is a much more difficult procedure than the transperitoneal method, and, second that it does not offer any greater advantage in the way of improved results than does the latter

In the consideration of the two methods of operating through the lower segment, it must be apparent to any trained abdominal surgeon that the attempt to proceed truly extraperitoneally will be vastly the more difficult, since to obtain the best exposure, a lateral abdominal incision of quite considerable extent is primarily necessary with subsequent blunt dissection and displacement laterally of the bladder and vesical plica, in order to make the only proper median uterine incision. It is hardly necessary to offer a detailed censure of the transverse or the lateral uterine incision, as the unnecessary dangers which they make imminent must be at once apparent. Moreover in the true extraperitoneal method the peritoneum is actually opened in a non-negligible percentage of cases, even in expert hands, and there is also the danger of deprivation of the vitality of the peritoneum by its separation In addition, the bladder is so likely to be injured that the advice is given by some to open the parietal peritoneal layer for its orientation, which is, of course, a confession of weakness on the part of the adherents of this method. In the consideration of this problem, then, it is to be understood that the term extraperitoneal cesarean section is taken simply to mean that the selected portion of the lower uterine segment has been made extraperitoneal before its incision.

With these qualifying statements in mind we may now consider the first of the two major questions of the problem, namely are we in possession of a method whereby infected cases may be treated with a favorable prognosis for the mother and the child? Academically this question may be answered as follows Cases which present themselves with the signs of a developed infection of a severe grade are not suitable for this procedure as experience has

shown that less hope is offered for the maternal life than is the case when other well-recognized procedures are employed cases after hours of labor with ruptured membranes, multiple examinations or attempts at delivery perhaps with foul discharge but without temperature will show a better percentage of recovery than by the classical operation, but a certain proportion will be lost who could be saved by craniotomy or hysterectomy cases long in labor with ruptured membranes but without evidence of infection (the so-called neglected case of the German writers) will be more safely operated by this than by the classical procedure The lack of the possibility of definite determinative classification so apparent in this academic answer becomes vastly more oppressive when one is confronted with the actual case in practice, since in reality the true decision as to the proper procedure must depend upon the type and virulence of the infection, a matter which cannot at present be determined. One case entering the hospital after some hours of labor but without temperature or other danger signal will develop fatal sepsis after delivery no matter whether it be by craniotomy pubiotomy classical cesarean or the extraperitoneal cesarean section while another case identical in history and general symptomatology will make a good convalescence after any one of these operations.

In the early days of the development of this operation it was hoped that it had solved the problem by which it had been created, namely the treatment of severely infected women in labor, and in looking over the literature of the past five years it will be noticed that the idea of utilizing this procedure in the delivery of clean cases was not generally thought of until its failure to meet the indications in the severe grades of infection had been demonstrated. That it will not save the virulently infected case is now admitted by at least the great majority of experienced German and French operators, and the most ardent supporters of this technique as Frank and Sellheim are now opposed to its use in the severe types of infection so often imposed upon a long-suffering hospital service, after the outside attendants have exhausted themselves physically by illy conceived and often barbarously executed attempts at delivery Indeed in one of his first communications Frank denied the statement which was attributed to him that by this operation great majority of infected women could be saved, by definitely stating that women may be expected to die after this operation as well as after any other obstetrical procedure In other words, to a great extent the type of infection which determines the subsequent history of the case and for this reason it may be permissible to reiterate that the large amount of space which has been consumed in the last few years in discussing the relative merits of the true extraperitoneal and the transperitoneal procedure has been wasted since the one, in a virulently infected case is just as useless as the other to check the advance Indeed, in the great majority of cases in which death has followed the true extraperitoneal operation it has been by peritonitis, and it is thus emphasized that in order to have a peritonitis develop it is not necessary to mechanically infect the peritoneal cavity and that simple stitching cannot make a germ-proof wall against invasion. Moreover the attempt to perform the true extraperitoneal operation is often rendered useless by unobserved laceration of the peritoneum while by interference with its vitality by deprivation of blood supply the result of its separation a lessened resistance to infection may result. In addition it is always to be remembered that infection by virulent organisms, of the cellular tissue of the pelvis or of the myometrium may be the cause of fatal sepsis, either with or without the development of peritonitis. For these cases of virulent infection we can, therefore, claim no increased armamentarium.

In this attitude Sellheim Frank, Pestalozza of Rome, Brandt of Christiania Bumm, Doederlein, and Baisch are in accord. In this type of case, craniotomy on the living but probably potentially dead child or the operation of hysterectomy either supravaginal, with the extraperitoneal treatment of the stump, or the cesarean hysterectomy are still the only hope. It is to be remarked in passing that in some of these cases Sellheim is an advocate of the utero-abdominal fistula operation, but he has lately become more conservative in this matter and would not prevent advocate it only if there was an absolute demand for a living child and if the parents were willing to take the increased risk. Sellheim indeed divides these cases into three groups first, cases suitable for the extraperitoneal cesarean section second, cases which demand craniotomy and, third fatally infected cases. He admits that this differentiation is not always possible and that the extraperitoneal cesarean section is therefore still an experiment in some cases.

There are still two great groups of cases to be considered relative to their suitableness for this operation first, true clean cases, in which it comes into competition with the classical cesarean pubiotomy and vaginal cesarean, and,

second, the large group of cases in whom infection may be suspected but in whom at the time of examination there is no infection demonstrable. These latter cases comprise the "neglected cases" of the German authors, and for them have a definite significance in that, by the use of this term, they designate a patient who has been long in labor with ruptured membranes, and who has had multiple examinations and possibly attempts at delivery outside the hospital, but without temperature or evidently infected liquor amnii. It must be stated that some authorities, as Schauta, an enthusiastic advocate of the classical operation, would not include such cases as suspected or neglected cases, but as true septic cases only suitable for craniotomy

It is to be remembered, then that in a good many cases this distinction between the evidently infected and the possibly infected or neglected case does not work out practically I have had a recent case which illustrated this to an unfortunate perfection.

A woman admitted to my service at the Presbyterian Hospital, without temperature or foul lochia, was subjected to craniotomy as her baby was dead. The cord was prolapsed and pulseless, and her doctor stated that he had made vain attempt to deliver her at her home by the use of forceps On her admission it was evident that not much attention had been paid to the amount of cervical dilatation which should precede forceps operation Her condition of shock seemed to preclude an abdominal operation and so the craniotomy was done She died in three days of septic peritonitis

In other words, she was a case which was in all probability doomed after the first application of the forceps, for while it may be an interesting theoretical question whether she would have been saved by a rapid hysterectomy I am of the opinion that no one of experience, in the absence of certain knowledge of the virulence of her infection would have dared to have thus delivered her In a word then, until we are in a position to determine the presence or absence of infection by scientific tests, such as bacteriological examinations, we shall be unable to accurately determine the proper method of delivery in all cases which we are called upon to treat, and if we were to be placed in the position to make these determinative tests to-morrow, we should still be no nearer saving the virulently infected case than we are to-day These cases will never be saved until the medical profession is so trained that they do *not* occur When the middle class patient can obtain in her own home the prophylactic oversight before labor which our hospitals now afford to the free patients in their dispensaries, then and not till then shall we be able to obtain the results in our major operative obstetrics which are our every day experience in abdominal surgery

Keeping this fact in mind that the differentiation between the virulent infection and the suspected or doubtful case cannot always be made in practice the question presents itself as to whether we are able to handle mildly infected cases of labor demanding operative delivery more safely by the extraperitoneal cæsarean than by the classical operation. In answering or attempting to answer this question it is necessary to say that any opinion now expressed must be merely tentative, since there is as yet not enough evidence to satisfy an observer unprejudiced by enthusiasm.

There is, however enough evidence to at least give us hope that a real advance has been made If in a given case it may be decided that it is simply necessary to protect the peritoneum from the direct contamination of the liquor amnii and the necessarily infected uterine wound.

If the statistics of Sellheim are examined we find that in 1911 he was able to report a series of forty-six cases, comprising twenty-one cases of contracted pelvis, fifteen of placenta praevia (all of which were clean) four of eclampsia, two of vitium cordis (one of whom had marked struma), one case complicated with a foul ulceration of the portio one case of marked prolapse with pus decubitus, one case in which the dystocia was due to a ventrofixation and one case of purulent meningitis, operated in the agonal period. Of these women five died, two of eclampsia one of placenta praevia (anaemia) one from sepsis, and finally the case of purulent meningitis. The fœtal mortality comprised six cases one each of the eclamptic and praevial placental cases, one of septic pneumonia, one due to pneumococcus infection in utero one as a result of strangulation of the umbilical cord by a knot, and one of lues congenita (14 days post-partum) The child dying as the result of the maternal eclampsia was underdeveloped, and it is certainly fair to exclude the death due to a knot in the cord as well as the death the result of syphilis from the fœtal mortality for the purpose of this study and to estimate the mortality of the children at three instead of six cases Excluding the fifteen cases of placenta praevia, which were all clean, it seems probable that the results here reported are somewhat better on the maternal side than if they had been delivered by any other single method Baumm reports a series of forty operations in two years He had two deaths from peritonitis. Ten of these cases should be left out of consideration, as they had unruptured

membranes at the time of operation. Twenty four were operated by the transperitoneal method and both deaths occurred in this group. With the exception of the ten cases all were of the suspicious class or as he says, more or less unclean." He is an enthusiast and believes that craniotomy pubiotomy the classical cesarean and to some extent premature labor will be crowded out by this operation. He followed Latzko's technique and believes it to be the best.

Kustner reports fifty five cases with two deaths from peritonitis. One of these was clean and one was suspicious. In neither fatal case was the operation truly extraperitoneal. All the other cases did well. Some of them had temperature in the puerperal period and two of the children were lost. He would limit the classical cesarean to cases in which some other intra-abdominal operation is necessary. He would perform the extraperitoneal cesarean section if the membranes being unruptured it is certain that the child cannot pass the pelvis. If there is some doubt as to the possibility of engagement he advocates the test of labor with the performance of the extraperitoneal operation if it becomes necessary. Kustner would limit pubiotomy even in multiparæ, and believes in the extra peritoneal operation in infected cases, and would employ it even if there was some question as to the condition of the child.

Doederlein advocates pubiotomy to 7 cm. conj. vera in multiparæ, as he considers the extra peritoneal operation to be more formidable. In infected cases both the extraperitoneal operation and pubiotomy invite danger and craniotomy is indicated. In thirty-two cases this operator lost three mothers and two children and two other children died in the first week.

Babch reports fifty cases. In three the true extraperitoneal type of operation was not possible and in sixteen there were small peritoneal wounds made by the separation. Three women died from eclampsia, ileus, and sepsis, respectively and six of the children were dead at birth. This author thinks that the operation is best for the suspected case without temperature, but with a probable infection of the liquor amnii.

Henkel reports twenty five cases and states that most of them were at least suspicious. He operated by the transperitoneal route entirely and had no maternal fatality. Opitz also operates transperitoneally. He is able to report a series of sixteen cases, of which some were suspicious with one maternal death. Bumm lost three women in his series of forty-two cases, and the deaths were all due to infection. Walcher is an adherent of the transperitoneal technique. In his series of fifteen cases he lost one mother and two children. Romer draws the conclusion from his statistics that the mother is safer under the operation of pubiotomy when performed in proper cases, than under the extraperitoneal section, but that the mortality of the children is greater. Thus pubiotomy gave, in his hands, a maternal mortality of 1.7 per cent and a fœtal mortality of 6.8 per cent, while the extraperitoneal section resulted in a 6 per cent maternal and but 2.4 per cent fœtal mortality. Latzko studied one hundred and fifty cases from the literature and calculated a general mortality of 7.3 per cent and a mortality from septic causes alone of 5.4 per cent. Jeannin collected one hundred and forty eight cases with eight maternal deaths from infection two from eclampsia and one from other causes, thus giving a maternal mortality of 7.45 per cent, with a purely septic mortality of 3.04 per cent. His statistics combined with Latzko's give a maternal mortality in one hundred and ninety cases of 7.37 per cent, and from infection alone a maternal mortality of 4.21 per cent. The morbidity was also high in this series being 30.7 per cent total with a morbidity of 25 per cent due to infection alone.

Lewis collected one hundred and two cases from the literature and calculated the maternal mortality to be 8.8 per cent while the fœtal was 8.6 per cent.

Taking the statistics which have been given as a basis for judgment, it appears then that we may admit that in the "suspected case," with the baby in good condition, we will conserve the interests of the mother by the performance of the suprasymphyseal extraperitoneal cesarean section in preference to the classical, and that the mortality of the child from the operation should be but little greater than by the latter.

Now as to the employment of the procedure in cases in which there is no question of infection, or in other words, in elective operations in clean cases.

Anyone reading Selheim's paper[1] without having had any actual experience with the usual type of cesarean operation would certainly conclude that it was an absolutely unjustifiable procedure. After stating that the Porro cesarean is less dangerous in truly infected cases than the extraperitoneal cesarean, he enumerates the following appalling list of dangers associated with the former procedure: intestinal wounding, greater loss of blood, loss of procreative power, longer rest in bed after operation, later return

[1] Zentralbl. f. Gynäk.

to work, abdominal hernia bad cosmetic result, and finally disturbance of the respiratory function of the child by the forceful forward displacement of the uterus outside the body of the mother with resultant infection of the child from inspiration or swallowing of infected liquor amnii. Moreover he believes that there is as much danger of wounding the bladder in the classical operation as in the extraperitoneal and in addition that there is great danger of infection of the peritoneum, either by soiling at the time of operation or by later leakage from the uterine wound. In addition the uterine cavity may be infected, there may be intestinal or omental adhesions, fixation of the uterus to the anterior abdominal wall, weakening or rupture of the scar in later pregnancy and abdominal hernia. He says Extraperitoneal uterine section is identical with vaginal cæsarean section all technical difficulties having been removed.

If ever there was an instance of special pleading we have one here. It would have been a perfectly justifiable arraignment of the classical operation if it had been published before the days of the aseptic era, but, in the light of our knowledge of the results which have been obtained in the classical operation in modern times, it is hard to understand how a man could become so blindly enthusiastic about any method, even one bearing his own name, that he could disregard the cold facts as attested by operators throughout the world regarding the Sanger operation in clean cases. Admitting as we have that the extraperitoneal operation is of advantage in a limited group of cases, and further admitting for the sake of argument that in perfectly clean cases, in the hands of men having had experience with this type of operation, the statistics for both mother and baby may in the future be as good as those now available in the Sanger operation, we are nevertheless forced to conclude that the burden of proof still rests upon the new operation

Difficulties in orientation of the bladder injuries of the bladder extension of the uterine incision, and increased difficulties in the delivery of the child are factors to be reckoned with in the two methods for the performance of the operation recommended in this paper If some of the other methods, as Latzko's, be undertaken, we have the added dangers of wounding of the great vessels and the ureters, while the peritoneum is injured in a non-negligible percentage of the reported cases by all true extraperitoneal methods. While it is of course perfectly justifiable to assume risks in order to avoid imminent dangers in obstetric, as in other surgical procedures it is certainly somewhat illogical to advise the giving up of a method such as the Sanger operation with its well-established technique in favor of a procedure which to say the least smacks of a return to the pre antiseptic days. Particularly is this true if we remember that in a series of three hundred cases Leopold was able to report a mortality of 1 2 per cent, that Pestalozza in a series of 111 cases had a mortality of 2 08 per cent (omitting four cases which were infected previous to operation) and that Richter of Dresden in a series of 107 cases was able to report a mortality of 0.9 per cent for both the mothers and the children. This last report of Richter is important from two standpoints the first, already mentioned, is the actual mortality while the second appears upon analysis of his series of cases, by which it is found that five of these cases had prolapse of the cord and that fifteen were second operations (of these there were three upon whom the operation of Frank had originally been performed) among whom he found that there were four presenting intestinal and omental adhesions and that in seven instances there were adhesions, mostly slight between the parietal peritoneum and the uterus Can any practical man approaching the subject without creative bias, convince himself that it is justifiable to advocate a procedure which is admittedly even by its advocates, a much more difficult performance as a substitute for an operation whose only dangers are those inseparable from all intra abdominal surgery? In the vast number of cæsarean sections by the usual methods, there are some twenty-six cases on record in which the uterine scar ruptured in subsequent pregnancy In the operations upon the lower uterine segment there are none as yet, though among the few cases in whom pregnancy has been observed after the suprasymphyseal operation there have been one or two cases in which at the time of the second operation the original scar was so greatly stretched that rupture seemed imminent but it is admittedly no great danger in either type of operation on the grounds of the universal experience with the Sanger operation, even with imperfect suture methods, while the knowledge we have lately gained as to the subsequent behavior of the scar after the vaginal cæsarean section will at least allow us to assume the like for the extraperitoneal method In so far as adhesions are concerned, it is proven that intestinal and omental adhesions of a degree sufficient to interfere markedly with the health or life of the patient are at least rare

after the usual cæsarean delivery but admitting that they do occur rarely and realizing that there can be no intraperitoneal adhesions in a clean case which has been operated upon by the extra peritoneal method, we must not fail to remember that there may be just as troublesome results of an adhesive nature after the operation now under investigation for it is to be remembered that while there are many points of similarity between the suprasymphyseal and the vaginal cæsarean there are also points of difference, in that in the former there is an abdominal wound which greatly increases the risk of adhesive trouble in the region of the uterus. Whether this last mentioned difficulty is real or imaginary can only be proven by the future

A very important question which must now be considered is the effect of the extraperitoneal suprasymphyseal section upon subsequent pregnancy and secondarily whether repeated operation in the lower uterine segment is likely to be more difficult than in the first instance.

It is, of course, too soon to be able to gather a large and convincing mass of statistics bearing upon these points, but still there is enough to enable one to at least form a tentative judgment. Hartmann reporting from Frank's clinic, is able to publish a most interesting paper upon this subject in which he states that as early as September 1908 he had seen one woman twice spontaneously delivered following the extra-peritoneal cæsarean by Frank's method. In the same paper he reports upon four cases who had undergone the operation twice and upon two cases who had three times been delivered in this manner In none of these women were there any difficulties observed during pregnancy and in no case was there a retrodisplacement of the uterus. The first case at the second operation showed a small hernia. She had been drained at the original operation. There were no peritoneal adhesions and no difficulty was experienced in separating the peritoneal folds. There was no uterine scar to be seen and the child was delivered spontaneously through a transverse uterine incision. The second case after six hours of labor showed a thinning of the uterine scar suggesting the possibility of rupture but the operation was completed without difficulty In the third case there was not only no difficulty but there was no need to do more than push up the peritoneum before making the uterine incision, as the bladder was uncovered. In this case also there was entire absence of any uterine scar In the fourth case there was some trouble in orientation of the bladder and also in the separation of the peritoneum. This patient developed chills and a urinary fistula subsequent to operation. All these cases had been drained through the abdominal wound and the second operations were all transperitoneal. In the fifth case, one of the two upon whom the operation had been done twice previously, he found a hernia and also some muscle adhesions, and in the sixth case at the third operation, while there was no hernia there was some scar tissue in the uterine wall at the site of the old incision. Sellheim has reported five cases previously operated by his technique, in three of whom labor progressed to a spontaneous termination, while in the remaining two he again delivered by his method. In both the operative procedure was more difficult, and the author puts especial emphasis upon this point in several of his articles. In one of the patients there was a widening of the uterine scar but this was not the case in the other Mayer reports two cases upon whom an attempted second extra-peritoneal operation failed in each instance because of the adhesions between the uterus and the parietal peritoneum. He was compelled finally to resort to the fundal incision to accomplish delivery In neither of these women was there any stretching of the uterine scar

Traupott, however has reported one case in which the scar was about to rupture. Litzchius (1912) mentions two cases of labor following a previous delivery by Latzko's method, in one of whom birth was spontaneous while in the other delivery was by the classical operation.

It is thus to be concluded that, in so far as we may judge by the statistics at present available, there is at least no marked tendency to rupture of the old scar or other difficulties in future pregnancy that labor is not likely to be influenced by adhesions, but that if a second extraperitoneal operation be undertaken it may be found to be impossible and in any event will probably be found more difficult in a large proportion of cases

In the preparation of this study it seemed to me to be fitting to collect the representative American opinions upon the subject, and I therefore sent out a list of questions to a considerable number of well-known operators in this country I asked that the questions be answered theoretically if the recipient had no practical experience to offer

Among the replies which I received there were but three who had had any practical experience, namely Dr Dickinson, whose case of elytrotomy has been earlier mentioned, Dr Howard A. Kelly

and Dr B C. Hirst. Dr Kelly has performed the operation once in a clean case before labor with a good result for both mother and child. He thinks favorably of the procedure and indeed is of the opinion that it may in the future become the method of election in all cases. Dr Hirst is enthusiastic with regard to the future of the operation. He has used various techniques, namely those of Bumm, Sellheim and the Veit Fromme, the latter with modification and upon the experience gained by a series of some seven cases he would at the present time use the method except in the severely infected case, to the exclusion of the classical procedure.

With the exception of these two operators the consensus of opinion is absolutely opposed to its performance in clean cases, and in but a small proportion of replies was it admitted that it had any field of usefulness. Some half a dozen men advocated its use in septic cases, there apparently being no very definite understanding as to the true field. But two men essentially agree with me in the opinion expressed in the body of this paper when considering the indications. The general expression of opinion may be epitomized as follows. The difficulties and dangers of the operation are so much greater than those met with in the classical procedure that any possible advantage possessed by the method is nullified. Believing as I do that the operation has a true field though a limited one and also believing that the future may show that the indications for the operation may be broadened by the advance in our diagnostic ability regarding not only the determination of the variety of microorganism present but its import from the standpoint of virulence, it seems fitting, in view of the attitude of the vast majority of the leaders of the profession in this country to say something here with regard to the technical difficulties of the extraperitoneal cæsarean section That it is a more difficult procedure than the ordinary intraperitoneal cæsarean is admitted, but the mere difficulty of an operation, if it has advantages not possessed by any other cannot be admitted as an argument against it, and in this instance the difficulties have been very much magnified. This I believe is due to the fact that in this country we have been led astray by the insistence of many of the foreign operators upon the extraperitoneal element of the operation, and have not realized that any case suitable for section can as well be done by the transperitoneal as by the extraperitoneal method. That this is true is evident from the fact that in both forms of procedure the uterus is left *in situ* and if its substance be virulently infected trouble surely will result in the one as in the other while if there be a virulent infection of the liquor amnii the damage will be greater in the true extraperitoneal than in the transperitoneal since in the former large areas of connective tissue are opened up while in the latter these same areas are undisturbed. If now realizing these facts which have been gradually evolved by experience, we consider the difficulties of an operative procedure such as Sellheim's second method or the Veit Fromme technique, I believe that it will be found that the difficulties are more imaginary than real to the operator experienced in abdominal work. I cannot agree with Sellheim that the operation is identical with the vaginal cæsarean, "all technical difficulties having been removed," or with Frank or Spaeth, who consider it a suitable operation for the general practitioner I do believe that it is more difficult than is the vaginal cæsarean upon a multiparous woman and that it is more difficult than the ordinary abdominal cæsarean and I do not believe that the unskilled man has any business with any of these operations unless under exceptional circumstances of isolation. But for the skilled obstetric surgeon the necessary variations in technique will be easily mastered. I believe that this operation will be performed in this country for the proper indications, by a rapidly increasing number of surgeons, with gratifying results, and I furthermore believe that it will in all likelihood be performed by the following technique, which is not only relatively but actually, simple and easy of execution. With the patient in the moderate Trendelenburg position a median longitudinal incision is made from the symphysis to within a couple of inches of the umbilicus. The fascia and the muscles are then separated in the same direction and to the same extent, thus avoiding the use of the Pfannenstiel incision a distinct advantage in suspect cases, since there can be but little doubt that this incision is more prone to suppuration than the ordinary longitudinal one and if infected will give a much more serious condition. The parietal peritoneum is then opened by an incision about two inches in length and the upper limit of the mobile portion of the visceral peritoneum is ascertained. This uterine peritoneal layer is then incised from the top of the bladder to the point where it becomes firmly attached to the anterior wall of the uterus. This last mentioned layer of peritoneum is then separated laterally on each side of the median line for a couple of inches throughout the length of the incision The conditions at this point of the

procedure are as follows the abdominal wall, exclusive of the parietal layer of the peritoneum has been incised from the symphysis pubis to a point several inches above thus giving ample room in which to work the parietal peritoneum has been incised from the lowest point possible namely the top of the bladder to a point which corresponds to the situation of the lowest area of firmly attached uterine peritoneum while the uterine peritoneum has been incised to an identical degree These two peritoneal leaflets are now united by a continuous buttonhole stitch of catgut. An oval opening is thus produced the upper extremity being formed by the attachment of the free parietal with the agglutinated portion of the uterine peritoneum while the lower extremity is formed by the union of the anterior and posterior folds of the vesical pelvic at the upper edge of the bladder A longitudinal incision in the uterus of about 12 cm. gives ample space for the application of the forceps which instrument serves the purpose better than the special hooked lever invented by Sellheim The amount of bleeding is usually not as great as during an intra-abdominal cesarean and moreover in one instance in which it was profuse during the delivery of the child, it ceased at once as soon as the birth was completed due to the occlusion of the blood vessels by contraction of the lower segment The uterine wound is definitely secured after the delivery and is closed by a double layer of catgut as in intestinal suture A continuous catgut stitch closes the stitched fold of the peritoneum and the remainder of the operation is completed in the usual manner In suspected cases of course the necessity for drainage may alter this method of closure The technique just described is the Veit Fromme with the modification that the folds of peritoneum are sewn after their primary incision instead of using clamps to make the closure. One of the great advantages of the method is that the bladder is not displaced, while the use of the median incision through all the layers obviates the dangers of infection of the larger areas of tissue exposed by the Pfannenstiel abdominal incision and by the lateral extraperitoneal flaps

I have been able to collect eight cases done by American operators. Seven of these were performed by Dr Hirst and one by Dr Kelly There may be many other cases and it is to be understood that no claim is made that this is a complete list but I have been unable to find any other reports either in publications or by personal letter I will therefore insert short synopsis of the case histories

Case (Hirst) This patient was primipara and had been in labor for twenty-four hours. Her membranes were ruptured when first seen Examination showed head of fetus, and the head of the child was large Forceps were applied twice before sending her to hospital In the first attempt the application was made with due regard to asynclitism, but, failing to engage the head, the last by physician attempted to deliver by the use of his forceps which he applied without any sterilization In this case the Sellheim technique was employed. The patient's uterus was sutured in several layers thoroughly closed, and the mother and child made good recovery

Case (Hirst) Had history of one miscarriage and one child delivered by high forceps at the seventh month Patient the dwarf with conjugata vera cm. Several cesarean sections had been made upon her outside of the hospital by the same man. Temperature on admission was 99° and her pulse was Had been in labor for 36 hours without engagement and was delivered by Sellheim's method. Mother and child discharged in good condition.

Case (Hirst) Primipara with true conjugata of 8 cm. In labor for 36 hours before admission, no engagement; was delivered by Sellheim's second method. Had slight febrile reaction for a few days. Mother and child discharged in good condition

Case (Hirst) Multipara. Conjugata vera cm. Patient's house case and had been in labor for 6 hours without engagement, at the time of the first pelvic examination. A examination was made at the time resulted in rupture of the membranes and prolapse of the cord. She had had several regular partus. Delivered by Sellheim's second method. Had badly infected wound owing to fever from the second to the ninth day. Both patients discharged in good condition.

Case (Hirst) Multipara. Conjugata vera cm. Patient's house case and at time of operation the membranes were still intact and the patient had not been in labor. Had been in labor about hours. Was delivered by Sellheim's second method. Had moderate rise of temperature with subsequent temperature from the second to the ninth day. Both mother and child recovered

Case (Hirst) Primipara. Had been in labor for days. The membranes were not ruptured and there was engagement. Had a the pelvis of the funnel type the external conjugate measured in both the transverse and posterior sagittal diameters. Was operated by the Sellheim second method and the bladder was injured but the rent was immediately closed and as to the result I find that refused to consent. Both patients discharged in good condition

Case (Hirst) Multipara. Conjugata vera cm. Had been in labor for eight days previous to the operation and had been in labor for hours after the membranes were ruptured. Was operated by the Veit Fromme method and was completed with the greatest satisfaction. The lower segment was markedly dilated due to the high position of the head, and there was ample room to work. Afebrile convalescence with primary wound healing. Child discharged in good condition

Case (Kelly) Had been delivered of children (conjugata vera cm. Operation performed before labor had started. Peritoneum incised, bladder separated but uterus not cut and only the right half of the bladder was separated. The peritoneum was not opened, as there was ample exposure. Longitudinal incision in the lower segment membranes ruptured and child delivered without forceps. Little bleeding after rupture of membranes and but moderate hemorrhage on incising the lower segment. Both patients discharged in good condition.

CONCLUSIONS

The extraperitoneal suprasymphyseal cæsarean section is an addition to the obstetric armamentarium.

Its chief indication is the "neglected case" or one that is mildly infected. Since the prognostic differentiation between the various degrees of septic infection is a matter of uncertainty the operation, in the words of Sellheim, is "of the nature of an experiment in many cases.

The operation is absolutely contra-indicated in the seriously infected case.

The performance of the operation in clean cases *is attended* with good results In experienced hands, convalescence is more smooth and less hazardous than after the classical procedure.

It is a more difficult operation than the classical, not only in gaining entrance to the uterine cavity but also in the delivery of the child the closure of the uterine wound is less difficult than in the Sanger method.

There is less loss of blood than is usual in the classical procedure.

The transperitoneal technique is to be preferred to the true extraperitoneal because of ease of performance less interference with the bladder and the avoidance of contamination of the retroperitoneal and preperitoneal tissue areas.

The preferable technique is the modified Veit Fromme.

Subsequent pregnancy and labor are usually not influenced adversely repetition of the procedure may be more difficult and in some cases it may be impossible.

The appended bibliography is by no means complete, but simply comprises a few of the more important papers on the subject which have appeared since 1907 It is interesting to note that in the year 1907 there were but four articles noted in the *Jahresbericht fur Geburtshilfe und Gynäkologie*. Of these there were two by Veit and two by Frank.

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SOME CAUSES OF FAILURE IN BACTERIN THERAPY

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THERE are many interrelated factors in the production of immunity and numerous minute details requiring the closest attention many of which although apparently insignificant, are really the prime causes of failure. I have attempted to briefly outline and consider the commoner ones and those that experience has shown me are more frequently the cause of trouble with the average practitioner

We may classify the causes of failure under the following general heads incorrect bacteriologic diagnosis improper bacterin either stock or autogenous improper dosage, either as to dose or interval between doses and lack of proper concomitant treatment

FAILURES DUE TO INCORRECT BACTERIOLOGIC DIAGNOSIS

In some cases it is possible to make a diagnosis clinically but as the action of bacterins is specific, it necessarily follows that an accurate bacteriologic diagnosis is absolutely essential. With the possible exception of cases of furunculosis an attempt at a correct bacteriologic diagnosis should always be made This may however be impossible, as for instance where we have a deep-seated abscess or where for other reasons it is not feasible to obtain the infectious material. Further the material obtained may not show or contain the causative organisms or they may not be recognized, especially where there are several other organisms present Through lack of bacteriologic knowledge and skill, the causative agent may not be correctly determined. Further especially in chronic cases of the respiratory tract, the infection changes from time to time and it is necessary to make frequent examinations and change the bacterin as the infection changes. Any of the above may result in an improper bacterin being given and necessarily failure must result. This may all be summed up under the head of improper bacterin due to incorrect or impossible bacteriologic diagnosis.

THE BACTERIN

1 *Stock bacterins* The stock bacterin used may not contain the proper strain. This the manufacturers of stock bacterins have attempted to obviate by producing what are known as "polyvalent bacterins, i e a bacterin containing a number of strains of the same organism but this is in reality only a makeshift, because if ten strains are used and only one of them is the proper strain, the dose given is only one-tenth of that particular strain the other nine-tenths of the dose being composed of other strains and probably having no effect. While this may seem theoretical yet it is a practical fact. Further the stock bacterin may not contain all of the bacteria causing the infection — may not be the proper mixture. It is advisable, therefore, to using stock bacterins to prepare your own mixtures. So far as is known, there is no definite disadvantage or objection, from a clinical standpoint, to using a bacterin containing additional varieties of bacteria, except that the patient's cells are called upon to produce antibodies to these additional bacteria, which are without any definite curative value so far as the particular infection from which the patient is suffering is concerned. It may therefore be considered as merely an additional tax upon the patient's cells without any direct, immediate benefit.

Failure may also result because a stock bacterin is not properly prepared. It may have been heated too high so that its immunizing properties have been destroyed, or the bacteria originally used in the preparation of the stock bacterin may not possess immunizing powers This we find is true in some cases in which old, avirulent stock cultures are used. The stock bacterin may be old, i.e. it may be overkept, as a result of which autolysis has taken place, and in certain infections this bacterin would be of no value because recovery or immunity depends to a great degree upon the formation of lysins by the cells. If the bacterin has undergone autolysis, this response is not called forth. In certain other cases the bacterin may be underkept, or as we might term it, green. Autolysis not having taken place sufficient amount of *endotoxins has not been liberated*, so that the formation of anti-endotoxins, the principal immune bodies in some infections, are not as speedily called forth from the injection of an older bacterin of this same variety

Again chemical changes may take place in the bacterin, owing to the dissolving of alkali from the glass, especially if it has been kept under improper conditions at room temperature On

Read before the Chicago Gynecological Society June 27 1913. (See discussion p 261.)

this account it is advisable to use Jena glass, and for this reason bacterins in ampules of Jena glass, or of the new Fiolax glass, which gives up even less alkali than the Jena glass, are to be preferred to bacterins in syringes, which are usually not made of Jena glass.

2 *Autogenous bacterins* These may not be prepared from the proper bacteria, or the predominating organism may be one that does not grow very readily and is, therefore overlooked or the bacteria isolated from the infectious material may not possess *immunizing* powers, and further, the bacterin may not be prepared properly It may be overheated, etc.

Dose The dosage may be too small. We therefore do not get a clinical reaction, the negative phase and the corresponding positive phase are very brief and the immunity does not rise very high. Such a condition does not produce the best results and may actually result in failure owing to the fact that the stimulation applied is not great enough. Or the dose may be too large, resulting in the patient's immunizing forces being practically exhausted, with the result that additional large doses cannot call forth a further response. This is to be obviated by careful clinical observation of the patient and the giving of only such a dose as will cause a very slight clinical reaction not increasing the dose as long as it continues to produce this slight clinical reaction. The frequency of dose varies, of course, depending upon whether the case is acute or chronic whether a large or small dose be given failures frequently result from the improper spacing of the dose Especially large doses should not be given at short intervals. The attempt to produce a summation of positive opsonic phases is the ideal one and the production of a summation of negative opsonic phases is to be avoided, as it usually results in failure.

Lack of proper concomitant treatment Lack of proper concomitant treatment has, in my experience been the cause of the greatest number of failures, at least so far as it has occurred in those cases in which a proper bacterin was used. We may divide this concomitant treatment into general and local. General treatment consists in the proper control of the eliminative organs — renal and intestinal. Constipation, intestinal indigestion, and fermentation produce toxic poisons that have an antiopsonic effect, and their formation and absorption must be prevented. Further the toxins produced by the infectious agent are destroyed by the spleen and the liver and are eliminated by the kidneys, skin, and intestines The intestines are also known to eliminate bacteria, therefore we must keep all of these organs in the best possible working order One can readily understand that the cells of the body and the organs of elimination may be overtaxed in combating the absorption of fecal toxic products, or at least so occupied that there is no reserve force capable of being stimulated by the injection of bacterins. Under general treatment also comes the treatment of general diseases other than the infection. We are always to search for certain constitutional diseases in every infection. An example that is familiar to all of us is the tendency to furunculosis in patients with diabetes. The mere injection of bacterins in these cases usually results in failure and it is only by careful attention to and treatment of the diabetic condition that results may be hoped for Further in certain diseases, such as leukemia and leucocythæmia the leucocytes possess very little phagocytic power, and it is possible that although you may produce a high opsonic index in patients with these diseases, recovery will not occur owing to the inefficiency of the leucocytes.

Local treatment aims at removing foreign bodies and sequestra harboring the infectious agent, otherwise continued reinfection occurs. Healing will not take place as long as there is an infected foreign body in the tissues, so that surgical measures wherever indicated require prompt attention Then, we may have a high opsonic index content of the general serum, but the local circulation may be sluggish or owing to local high pressure conditions, the opsonins may not have access to the local lesion. This is to be remedied by free drainage, or such measures as tend to produce a local hyperæmia — the use of hot fomentations, Bier's hyperæmia, Finsen light, manipulation massage etc. These of course, will all tend to produce auto-inoculation and in certain cases are to be avoided. Especially is this true in tuberculosis. The patient should be placed in bed at absolute rest, as exercise *results in auto-inoculation*, which, *if* continued, will have practically the same effect as a too frequently administered dose of bacterin.

The local use of antiseptics must be governed by the following rules a sufficiently concentrated germicide must be used to destroy all of the bacteria leaving a sterile site, otherwise the destruction of tissue will merely augment the further action of any bacteria that have not been destroyed or a mild antiseptic may be used, sufficient to inhibit the multiplication of the bacteria but not sufficient to destroy the tissues. Preferably antiseptic solutions are to be sup-

planted by the use of Wright's 5 per cent sodium chloride, sodium citrate solution. This prevents coagulation and augments osmosis, thereby promoting the flow of lymph with its increased opsonin content. The lymphatic circulation may also be enhanced by the administration of citric acid, 30 to 60 grains three times a day as advised by Wright.

There still remains a possible cause of failure in the *lack of a sufficient number of active* leucocytes. Exactly how this may be remedied is not yet definitely known. We can increase the number of leucocytes by the administration of nuclein, sodium cinnimate, pilocarpine, or salicylic acid, but we have no knowledge or direct evidence to prove that the phagocytic power of these leucocytes is normal. Personally I have used nuclein with apparent clinical success. This seems to me to be the most rational of the drugs mentioned as it is a constituent of the leucocytes themselves.

Failure may possibly also result from an improper selection of the site of injection. Our present knowledge would indicate that subcutaneous or intramuscular injections produce the best results. Wright and Allen do not believe that intravenous injections are of value. They reason that the blood is not actively engaged in the production of antibodies, therefore the circulating streptococci in septicemias do not result in the production of immunity. That this is not a general rule however and will have to be definitely worked out for each organism has been proven recently by the fact that in contagious abortion of cattle the best results are obtained by the intravenous injection of the bacterin. Whether this holds true for any other organisms we do not yet know.

There are some cases in which failure results for reasons as yet unknown. It is very evident that all infections, or all persons, irrespective of their infection, are not amenable to bacterin treatment. Some are incapable of responding. *Bacterins will not* produce a cure in *all* cases, and the tendency of the times, owing to the apparently wonderful successes, is toward over enthusiasm. We are repeating with bacterins the history of tuberculin — using them for everything irrespective of the indications, and usually with a free hand, often without any definite reason, and in any disease whether it be a proven infection or not. Cases are being reported of wonderful success very frequently the number of cases is not mentioned, and the average clinician, *without opsonic or bacteriologic control*, is using any bacterin, in every sort of disease and reporting wonderful results in one or two cases. He becomes overenthused, and passes this enthusiasm on to others, but many times they are doomed to failure. This is a very unfortunate condition, for bacterins are of value, if thoroughly understood and rightly used, and do produce results in many cases that are nothing short of wonderful. I sincerely hope that before long they will be sufficiently understood, their indications and *limitations* known and recognised. They will then obtain and maintain their proper place in therapeutics.

NEW APPLIANCE FOR THE INTERNAL FIXATION OF FRACTURES OF THE FEMORAL NECK

By M. E. PRESTON, B. A., M. D., Denver, Colorado

FRACTURES of the neck of the femur, for years, have been among the most difficult we have had to treat. Operative intervention in these cases has not been satisfactory because of the difficulty of holding the fragments in position even after they have been exposed. The reason for this difficulty is most apparent if we study the internal structure of the upper end of the femur. The illustrations of sections of the upper end of the femur (Figs. 1 and 2) give a good idea of the relative disposition of the compact and cancellous tissue in the femoral neck.

When, during operation, reduction is temporarily accomplished by traction and manipulation, and an ordinary screw is driven through the trochanter and neck, the fixation thus accomplished is practically worthless. As soon as upward traction is exerted on the shaft by the heavy muscles of the thigh and hip, the cancellous tissue on which the screw takes its hold, crushes, and the usual deformity follows (Fig. 4). A roentgenographic study of the cases operated on in this manner will show the inefficiency of securing the fragments by this method. It is granted that

good results have followed this operation, but I am satisfied that in most instances they have been due more to the action of a properly applied Buck's extension during the after-treatment than to the securing of the fragments by means of the ordinary screw or nail. The essential reason for this failure in fixation is due to the fact that the ordinary screw or nail used for this purpose secures its hold only in cancellous tissue.

To obviate this difficulty I have devised a screw-plate which secures its hold on the compact tissue below the great trochanter and will maintain the normal angle of the neck in spite of the action of the thigh and hip muscles. It is a combination of a screw and a plate in one piece. The screw portion is of the ordinary wood type and is made in varying lengths while the plate part is fashioned after the Lane plate. The screw portion joins the plate at about 110 degrees, which is less than the angle at which the femoral neck joins the shaft. This difference is due to the fact that the surface of the shaft just below the trochanter is not parallel with the axis of the femoral shaft, and since the plate secures its hold on this portion of the bone, the angle has been adapted accordingly

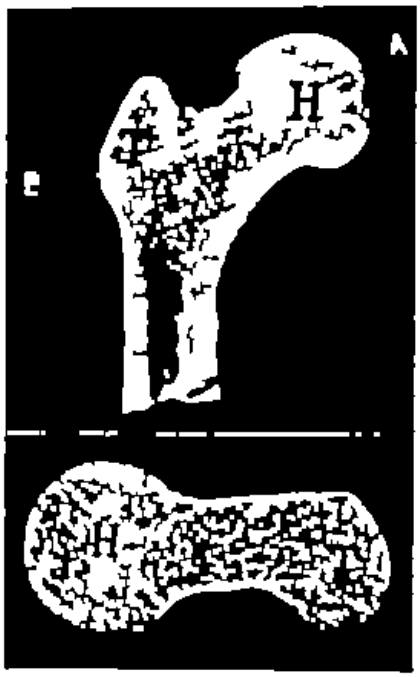


Fig. Coronal section of upper end of femur showing the relative disposition of compact and cancellous tissue.
Fig. Section of femur corresponding with the line A B in the preceding figure.

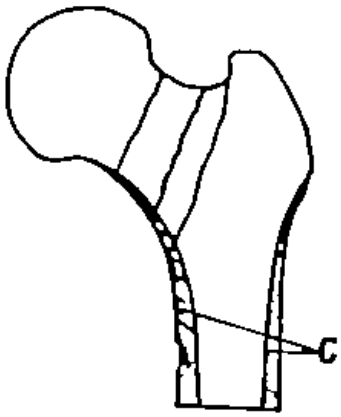


Fig 3.

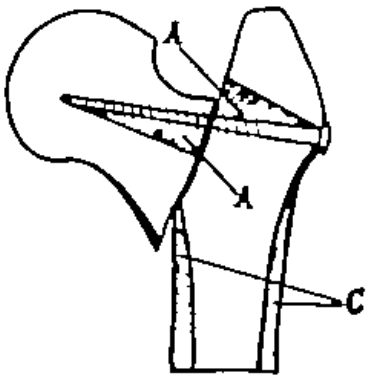


Fig. 4.

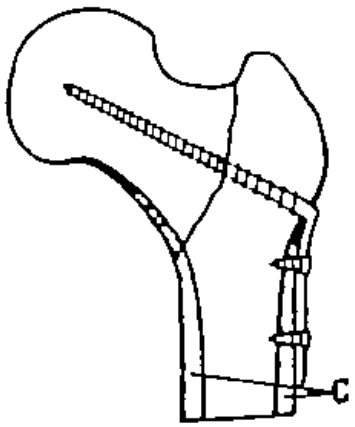


Fig 5

Fig 3 Diagram of femur showing the common sites of fracture of the femoral neck

Fig 4 Diagram showing the manner in which the cancellous tissue crushes when the neck is subjected to the displacing action of the thigh and hip muscles, following operation with simple screw or nail

Fig. 5. Diagram showing the author's screw-plate in position. Angulation of the screw portion is prevented by the plate portion which secures firm hold on the only available compact tissue in this region.

The length of the screw portion varies with the size of the bone and the position of the fracture. When the break is near the inner end of the neck, the screw should extend well into the head of the bone. When the fracture is situated at the base of the neck a shorter screw will accomplish the desired fixation. A number of sizes should be at hand so the surgeon may select the proper length.

The angle at which the plate joins the screw is such that the plate clears everything as the appliance is being screwed into position. Before the screw is entirely driven home the plate should be bent with pliers so it will fit the surface of the femur with which it will ultimately come in contact.

I have not as yet used the appliance in a sufficient number of cases to give a report which would be particularly valuable or conclusive, yet the mechanical fitness and ease of application of this screw-plate have demonstrated its value, pending a further report

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

A Regular Meeting was held June 27 1913, with Dr. Frank W Lynch in the Chair

CARCINOMA OF THE APPENDIX

Dr. Emil Ries I have some rare specimens that may interest the members The first one is a case of carcinoma of the appendix. It is the first one I have had, and I want to say I got it entirely accidentally I opened the abdomen of this patient, a woman 40 years of age, on account of chronic salpingitis, with adhesions, and we supposed that her intestinal difficulty constipation and so on were due mainly to the adhesions. When we opened the abdomen, freed the adhesions and removed the pus tubes, which she had, I looked at the appendix and found a perfectly solid structure This appendix is cut open in several places and you can see on the cut-surface how the muscular coat of the appendix is contracted, and the center of the organ is solid and is protruding through the sheath of muscular tissue This is entirely different from what we are accustomed to see in cases of obliteration of the appendix, and the feel of the appendix should immediately tell us this is not an ordinary obliterated appendix The ordinary obliterated appendix when it is cut open, shows a tendency to retract in the center because the slight amount of cicatricial connective tissue that forms there is more liable to draw back than to push out Here the center is pushed forward. It evidently is under more or less pressure. It was clear that woman had something different from the ordinary obliteration of the appendix, and the microscope confirms the diagnosis of malignant neoplasm.

It is not absolutely certain whether it is an adenocarcinoma or an endothelioma. There are few traces of lymphoid tissue. The rest of the appendix, except the muscular coat, is taken up by a net work and mesh work of epithelial, or epithelioid cells which are arranged in files of one or two then they run together in large masses of cells, and these larger masses contain acant spaces or alveoles which remind one of the formation of endotheliomata I have placed under the microscope one part of the appendix which shows this mass of endothelial neoplasm very distinctly

I have made dozens of sections and find in various parts of the appendix that the endothelial neoplasm apparently does not reach outside of the muscular coat It is found within the muscular coat completely It is not the nature of carcinoma to respect the muscular coat in any way It is the nature of carcinoma to break through it I found a number of sections in which the carcinoma had broken through the muscular coat and was in the serosa of the appendix I have sections which show the carcinoma in the serosa of the appendix

Carcinoma of the appendix occurs in two forms one the solid form and the other the form in which a large amount of mucus is produced You doubtless remember the case of Dr Watkins, which was in the shape of a cyst. That cyst proved to be a carcinoma of the appendix, with the production of so much mucus that it had distended the appendix. These are the two forms, the present case being the solid form in which you can see solid masses of neoplasm very distinctly

Here is the carcinoma in the serosa. As far as one can tell in the living, I have investigated the gall-bladder and stomach and intestines as far as I could and there is no tumor anywhere else. I removed the appendix without leaving any stump. I excised the appendix at the cæcum, made a fair sized hole in the cæcum and sewed up the hole and extirpated the whole structure. The patient has had no return or trouble of any kind.

Cases of carcinoma of the appendix are interesting in this particular that the tumor is rather benign. There are a considerable number of cases on record in which surgeons have gone into the abdomen and accidentally found carcinoma of the appendix This woman had no symptoms of appendicitis or of any tumor There are no metastatic glands anywhere. She is in perfect health so far The operation was done five months ago.

STRUMA OF THE OVARY

Dr. Ries I have here another specimen of case of struma of the ovary I removed from a woman an enormous tumor of large size which was filled with colloid material which contained apparently one cyst I the wall of that cyst was one rather hard nodule the size I should say of a 50-cent piece, and it was about one-half inch thick Sections through the thin part of the cyst showed nothing but an ordinary thick wall, and I found no epithelium on it, as one finds in so many cases where the cyst has been very much stretched. But in the solid part I found peculiar condition I found the solid part to consist, first of all of material which as the hardening process coagulated to the consistency of almost cellulaeida, and it appeared like the colloid of the thyroid gland When we made the sections we found it was typical thyroid gland, the normal epithelium of the thyroid, but he colloid in the alveoli of the gland is of various kinds You know that the colloid of the thyroid gland does not always stain the same way in the same gland Some parts take more of the eosin stain, and some more of the hæmatoxylin stain, and with Van Gieson's stain we get various colors this was true of this gland I certain lower cysts-on wall of the more solid

portion of the tumor we found longitudinal slits which are characteristic of cholesterin which has been dissolved out in making the celloidin preparation. The microscope shows the typical thyroid structure and the thickness of the tumor wall. The last gland I removed from the neck. How does the thyroid get into the ovary? The simplest explanation is that there is growth of the thyroid the same as there is growth of other derivatives of cells which by an error of development get into the ovary. In all these cases we had to examine carefully to see whether there were any other structures except that one in the ovary. In order to characterize the tumor as embryonal or the derivation of more than the germinal epithelium. I have examined considerable number of sections of this tumor and I have found nothing else except thyroid tissue. Of course when we find thyroid tissue, the next thing to look for is cartilage of the bronchial tree. We found no cartilaginous cells. There is no structure except thyroid tissue. There is nothing of any other organ, so that we have here one of these rare cases. There are twenty on record, all developing in one organ, only in an aberrant way and in an abnormal locality. This is a parallel case to the case of another practitioner, in which a single tooth was found in the ovary. In that dermoid structure there was just one tooth. In the same way just a thyroid gland developed here.

The two specimens, the one from the ovary and the other from the neck, show the thyroid tissue and cholesterin in the same field. This development of cholesterin in the colloid of the thyroid is nothing peculiar to the ovarian stroma. It is found in the stromata of the neck as well.

I have a number of thyroids which I have removed which show this development of cholesterin. In one case in which I found it more than in any other the patient had a thyroid fistula. This fistula led down to the thyroid gland, and had developed after an attack of typhoid fever. The patient had typhoid fever and contracted an infection of the thyroid from the typhoid. A doctor opened up his typhoid strumitis, and evacuated a large amount of pus, but the abscess-cavity did not close. It had discharge from the cavity. We took some of the discharge from the thyroid, made a Widal test and found it was positive. This cavity contained bony calcified masses, such as those described in Kocher's paper and, as all these fistulæ are arranged, this fistula extended downward, and that is one of the reasons why it did not close. The deepest part of the fistula existed when the mass was standing up. The thyroid was dissected away from the spinal column and extended to the side of the œsophagus. I injured the jugular vein and the thoracic duct. It was all one mass of adhesions and fibrous tissue. The thoracic duct discharged the customary amount of milk for five days, and then the patient got along all right. In that thyroid there was a great amount of cholesterin. In some cases, if you open the thyroid, you can see the cholesterin glisten. If you shake the fluid you can see the light reflected in these cholesterin crystals.

DISCUSSION

Dr. Jones. Do you not consider it very important to make sure of the diagnosis as to whether it is endothelioma or adenocarcinoma, as having a bearing particularly on the prognosis? Usually it is better to determine which it is.

Dr. Reis. I do not believe that we can say there is very much difference in the malignancy of endothelioma and the malignancy of adenocarcinoma. I think it is six of one and half a dozen of the other. At first, one would say this is a carcinoma, until you have examined the specimen and found vacuoles, perfectly round, without mucous secretion. You are reminded more of an endothelioma than an adenocarcinoma. I think it would be rather fruitless to quarrel over the differential diagnosis. I would rather leave it to a better pathologist than I am. As far as the prognosis is concerned I do not see that there is much difference.

Dr. Jones. Zeit and others hold that endothelioma is not so malignant as carcinoma, that it occurs locally and metastasis occurs late, which is not true of endothelioma, particularly of the lymphatic type.

Dr. Reis. A case in which I saw the largest amount of metastasis was one of endothelioma of the uterus which Zeit described in his paper on endothelioma. That case had enormous metastases, in such incredible locations and in such enormous amounts, that it was an exceptional instance. The microscopic slides proved it was an endothelioma of the uterus. There was no ulceration but there was hemorrhage. An exploratory incision was made into the cervix, in which we found endothelioma. The patient did well. She went on a trip to Europe, and four months after she left the hospital I got a letter from her from Naples stating that she had rheumatism in the knee. The attack of rheumatism spoiled her trip. She returned to America. After her return in getting out of bed she broke her thigh leaving a large bony tumor sticking out at the hip. This woman soon showed local recurrence especially in the bladder and died in less than two years after operation. She was a mother and the wife of a physician and understood the value of post mortem examinations, and left word with her son that I was to be notified when she died. I was notified within half an hour after her death. I made a post mortem examination. This woman had metastases in various organs of the body. She had in the upper end of the vagina one mass of tumor which had broken through into the bladder. The pelvic connective tissue was one tumor mass. The tumor involved the wall of the rectum. The large so-called bony mass that stuck out at the hip was an enormous carcinoma of the sciatic plexus as large as a fist. I have a section showing endothelioma between the nerve-fibers. The femur was not broken. I cut the femur open. There was no fracture of the femur. She had metastases in the kidney and spleen. The liver weighed 8 pounds. She had metastases in the adrenals, in the lungs, the pericardium, and the retroperitoneal glands. In short, there was

not an organ in the body that did not have some metastasis. We do not see endotheliomas frequently. They are comparatively rare in comparison with carcinomas.

CHORIONIC VILLI

Dr. Ries: A few weeks ago I showed sections and a gross specimen of a case which I diagnosed as chorionic villi remaining in the uterine wall eighteen years after the last labor. For those who were not present at the time I may recall a few facts. This woman had a fibroid tumor. I operated on the fibroid and removed it by supravaginal amputation. The operation was not attended with any difficulty whatsoever. When I was through with the operation I proceeded to investigate the specimen and noticed on the cut-surface, where the body of the uterus was cut away from the cervix, whitish string hanging out of the cut-surface. Following up this whitish string I found it extended into a vein, and found that this vein extended to the length of from two to six inches, so that the upper end of the string was in a vein in the right uterine horn when the cut-surface was that far away from the right uterine horn. In cutting through the uterine wall I found other veins filled with smaller white strings, and on grasping some of these strings with tissue-forceps I found I could pull them out in a sort of bunch, like grapes, which reminded me of chorionic villi. I made macroscopic sections which showed the shape of the white strings which filled the vein, and found them to be composed of chorionic villi, round, elliptical, branching, ramifying. The substance consisted of fibrous tissue with blood-vessels, the blood-vessels containing blood-cells the same as the rest of the uterus contained. The epithelium was covered with these villus-like masses. The endothelium lay flat. Each villus was apparently attached to the wall of the vein in some way and where it was attached to the wall of the vein it perforated the wall of the vein, rupturing the circular muscular coat and penetrating the surrounding tissue. This tissue showed more or less homogeneous fibrous structure going through the vessel-wall into the uterine section. When I showed the sections at a previous meeting some of the gentlemen differed. One could see a double layer of epithelium. Another one could see syncytium. I could not see that. I still have been unable to find any syncytium. I wish I could find syncytium; then there would not be any doubt of these things being chorionic villi.

I did not say anything about what had been found in the literature regarding similar structures in certain cases of chorio-epithelioma. Dr. Robert T. Frank, of New York, wrote me a letter raising the question as to whether it could be proven absolutely that these were chorionic villi, or if it was not possible this was one of those comparatively rare cases of "vein myomas." He himself had a case of chorio-epithelioma in the testicle of a man in whom these white masses had grown into the mass and filled the veins to a greater or less extent. This structure is not distinctly that of chorionic villi the same as in my case, because there was no distinct syncytium covering the apparent villi.

What is to be said in favor of the idea that these things are villi? First, their shape. What may be said against the idea that they are villi? First, the remarkable length of some of these clots. Who has ever seen a villus that long? Of course, it is possible that this long string which I found in one of the veins was not one villus but a whole villous tree, which became squeezed into the vein, the lateral branches of which were partially obliterated, so that this is the original part of the chorionic tree.

I am rather inclined to think the idea of calling these things "vein myomas" gives us an easier explanation, especially for these very long ones. The chorionic villi which were attached to the wall of the vein showed perforation of the vein circumference and the circular layer of muscular tissue forming the vein in such cases is against the nature of these things being "vein myomas because "vein myomas" originate in the muscular layers of the vein. Until we have a definite characteristic of the difference between "vein myomas" and chorionic villi remaining in the vein, the matter must be left in a state of suspension.

As I have said, I have not been able to find syncytium, which one of the doctors believed he saw, and until I recognize the force of the conclusion that such formations may be due to vein myomas, we must regard the matter as uncertain. However until the matter is cleared up we must leave the case reported in the literature as one of chorionic villi remaining in the uterine wall eighteen years after the last labor. I have considered it my duty to make a report in which I mentioned Dr. Frank's letter and the importance of this discussion of this case.

DISCUSSION

Dr. Frank A. Stahl: Dr. Ries has brought out the point that he was not able to find syncytium in the specimen that he presented at a previous meeting of the society. Dr. Webster was rather inclined to the opinion that this was one of the points of differentiation, and that this specimen showed the development of chorionic villi characteristic of a certain period. This is a familiar subject, and we all know that in the later months of villous development we have the absence of syncytium, so-called. I presume it is called syncytium from the so-called immediate action of the cell in its environmental tissue. Later on in its development the mucoparous limiting stroma disappears more or less and you have practically a granular limiting membrane which I do not think is a limited membrane but which is merely mucoparous stroma mixed from the absorption of the granules. Its surrounding tissue is broken down by the amoeboid action of Langerhans nuclei or cells. In the specimen we still

have these brown granules which are characteristic of syncytium.

I would like to call attention to the fact that in the specimen exhibited that evening there was a limiting structure which was characteristic of syncytium so-called.

As regards the length of development, in the report of a two weeks' specimen of extra-uterine pregnancy I showed a villus which extends from this small chorion down to the inflammatory exudate in the ampulla of the tube. Instead of developing in the nature of a string-condition of the villus, which is characteristic of villi in cases of extra-uterine pregnancy where you have a club-shaped, juicy rapidly growing expression of the root, there we had a string-like formation. It was impossible for us to obtrude upon the generosity of the editor otherwise I might have presented a case of chorionic villus in that small type of gestation which would apparently approach the suggestion Dr. Ries has made here this evening. It was a long drawn out string, but as it was only a two weeks' pregnancy I removed it at the end of 8 or 9 days. As a comparison it would be favorable to Dr. Ries string of the same order and it grew in a perpendicular rather than in a longitudinal direction instead of budding out in all directions.

As regards the venous myoma structure I think we had better leave the subject just as Dr. Ries mentioned it, but the specimen surely presents a villous development such as we suggested the other evening.

It is gratifying to me, Dr. Ries, that all your work would seem to be confirmatory of the suggestion I made in my work at that time, not thinking it would be possible to have it confirmed by a member of our society. In my reprint I showed you the nuclei, the external layer wandering into all coats of the tube.

THE PERSISTENCE OF GONORRHOEAL ARTHRITIS IN THE PRESENCE OF CHRONIC GONORRHOEAL INFECTION IN THE FEMALE GENITALIA

Dr. D. B. Peterson. Both of the cases I wish to report are instances of joint-infection, one gonorrhoeal and the other tuberculous. I will present the first case of gonorrhoeal infection. The patient was female, eighteen years of age, who has had trouble with her joints for eleven years. When she was seven years of age she was taken with rather acute symptoms in the right knee-joint, followed by an effusion into the joint, and thus developed into chronic condition which persisted for about a year. Finally diagnosis of tuberculosis of the joints was made and the patient was treated with plaster of Paris cast for two years. Then from about the ninth to the fourteenth year she had recurrent attacks of effusion into the joints and was on crutches most of the time. From the fourteenth year on, for the last four years her right knee-joint did not bother her very much. It became rather quiescent, but there was considerable stiffness in the joint. Three years ago the left joint became involved, and during the last three years she has had repeated attacks of pain in the joint, followed by a marked serous effusion and pain which kept her off of her feet three or four days at a time. She would improve, and after a few weeks the effusion in the joint would disappear to be followed by a recurrence. An examination of her at the time showed in the right knee, which was involved for eleven years, a moderate amount of thickness about the joint. There was a restriction of motion to about one-half in the joint but only a small amount of tenderness on manipulation. Examination of the left knee-joint showed a very marked deviation and just mild inflammatory signs in the joint. The first thing I did, after making this physical examination and finding evidences of chronic arthritis in the joints, was to have X-ray pictures made of the joints. From the X-ray plates I was able to see that almost certainly the process was due to gonorrhoea. I want to show you these plates of the left knee, where the process was only of three years' standing. They showed practically no changes in the bones. The plates of the right knee show no local atrophy, but they show an undermining of the cartilage of the epiphysis of the tibia. This is a finding which is quite characteristic of either. It is a condition which, when we find it, is nearly always due to either tuberculosis or to gonorrhoea; and in addition to this undermining of the cartilages on the sides there was an arrested growth of the epiphysis in its anteroposterior diameter. This arrested growth is due to the fact that there has been a chronic arthritis, with restriction of motion, and the bone had not gone through the normal range of motion, and for that reason was not more than one-half as thick in its anteroposterior diameter as it should be.

These lines on the side are practically always due to either tuberculosis or gonorrhoea. If this was due to tuberculosis, there would be extensive destructive changes there. The fact that the left knee was not involved after three years practically rules out tuberculosis, because there could be extensive destructive changes there in that case.

After this physical examination and the X-ray examination, I felt practically sure the trouble was due to gonorrhoea, and I got some more of the history. I found that when the child was 4 and a half years of age she developed a vulvovaginitis, and within six months afterwards the right knee became involved. I got a history that with every exacerbation in the joints, even before puberty she could have leucorrhoea. As the general condition quieted down the leg would improve, but sooner or later there would be a recurrence of the trouble. Since puberty she has had more leucorrhoea, with the joint-attacks, and she has also had occasional attacks of pain. Last fall she had two attacks of what we diagnosed as appendicitis. Then I made a pelvic examination. I found a mass to the right of the uterus. As it was nothing that I could feel I left it. Then I called in Dr. Irons, and he made a series of laboratory tests. He made the fixation test, the allergic reactions, and got a positive skin reaction to the gonococcus but a negative one of all the other organisms. He examined the blood, and Wassermann was negative, but there was a complement fixation for the gonococcus. He tapped the knee joint and got a serous fluid from which he made cultures and recovered the gonococcus from the knee-joint. That verified the diagnosis. The child had had gonorrhoeal pelvic infection when six and a half years of age, with involvement of the right knee joint lasting for eleven years. The involvement of the left knee joint began eight years afterward and lasted up to the present time.

The interesting features about the case are the persistence of the joint-infection and the inter

mittent recurrence or intermittency of the process in the joints.

Another interesting feature was the late involvement of the left knee-joint, then the presence of a tumor-mass in the pelvis. In gonorrhoeal infections in children, involvement of the tubes leaving a mass is very unusual and it is a question if the tubular involvement is not a recent condition either due to a lighting up of the old infection or possibly to a secondary infection, that is, of an acquired gonorrhoea in the last year and a half or two years. The patient gives no history suggestive of this, but it may be in the same way that the joints light up, so may the pelvic process occur thus causing this tubular involvement of the right side. The persistence of the process in the knee-joints is, in all probability due to the fact that the pelvic condition has never cleared up. If the pelvic condition had cleared up in all probability the process in the joints would have disappeared long ago. We know that this is the case with metastatic gonorrhoeal infections in other locations, and it is the case in the male. A chronic gonorrhoeal prostatitis is responsible for the persistence of gonorrhoeal arthritis and for the recurrence of the process in the same way in infections of the uveal tract and of many other locations.

I think the ideal treatment, if we could have carried it out, would have been to remove the adnexa but it is a question if removing the tubes alone would have been sufficient. Probably a panhysterectomy would have been necessary to get rid of the pelvic infection and then the gonorrhoeal arthritis would, in all probability have cleared up.

The second case I will relate briefly to show the comparative value of the laboratory findings in the two cases.

The second case was a twenty-three year-old Polish woman from whom we got a very imperfect history. She was married at the age of eighteen. She had had no miscarriages and no children. Seven years ago she was taken with arthritis of the right knee-joint and has been bothered with it ever since. In this case the process is much more severe than in the other. She has been on crutches most of the time. Two years ago she developed abdominal and pelvic symptoms, the exact nature of which we did not ascertain. She was operated on at the Cook County Hospital, a laparotomy being done. She came to us complaining of the knee. She was on crutches. She had a stiff and swollen knee, and also pelvic pain. Examination showed a very much thickened knee-joint, with a small amount of effusion, and an X-ray examination of the joint showed that very destructive changes had taken place. It is easy to see the striking difference between the joints in this case and in the other due to gonorrhoea.

The semilunar cartilages are entirely destroyed. The cartilage of the ends of the bones is destroyed and there is considerable destruction of the bone itself. There is marked local atrophy so that the X-ray findings in this case seem to indicate tuberculosis. The pelvic examination showed the uterus to be retroverted, with a firm tumor on the right side. Dr. Irons made laboratory tests in this case. The skin-reactions were negative. I will say that the von Pirquet was not made, unfortunately but for the gonococcus and all of the other organisms the skin-reactions were negative. All of the blood-reactions were negative. There was no Wassermann, no complement fixation of the gonococcus. The fluid from the knee joint showed nothing culturally.

On the strength of these findings we made a diagnosis of tuberculosis of the knee joint, and the diagnosis as to the pelvic condition, while it was not positive, was supposedly a tuberculous process.

Dr. Heaney opened the abdomen and found tuberculosis of the tubes, ovaries, and of the endometrium and a healing tuberculous peritonitis. The knee-joint was resected and we found very extensive tuberculosis of the knee-joint in the ends of the bones.

As in the other case, the process started in the pelvis and extended to the joints and persisted in the joints because of the persistence of the process in the pelvis. The process in this case started in the right knee joint, persisted for years, producing very extensive changes, and then gave rise secondarily to a tuberculous peritonitis of pelvic involvement. It was the reverse of the other condition. While the pelvic condition in the other case gave rise to joint-involvement, here neglect of the general condition gave rise to pelvic involvement.

I will show you the specimens of tuberculosis of the knee and tuberculosis of the genitalia.

Microscopically there is involvement of the endometrium complete destruction of the mucosa of the tubes, which is fatal with tuberculous disease, and then the process in the ovary was just a typical tuberculosis. There was no involvement of the muscle of the uterus in this case.

DISCUSSION

Dr. Ernest E. Irons: An interesting feature in this case was the recurrent character of the

arthritis. It is true that in these cases the arthritis was not recurrent at any definite period of a certain number of days or weeks, but in other ways the case was similar to the one which has been called intermittent hydrops of the knee. There are recurrent attacks of arthritis, swelling, effusion, temporary disability leaving a relatively intact knee, such as one sometimes notices in an intermittent hydrops in which practically the only difference clinically is that in the intermittent hydrops we have a definite cycle or day

We had recently another case of true intermittent hydrops with a ten-day cycle in which we were able to study the various reactions of the blood and skin, and in which in one of the recurrences of the hydrops we were able to isolate the gonococcus. I know that there are many cases probably of intermittent hydrops that are not due to the gonococcus but from a study of three or four cases we have been able to make in the last four or five years, of gonococcal origin, it would seem that a considerable proportion of the intermittent hydrops cases are really of gonococcal origin. In this particular case of intermittent hydrops we were able to make out that there was a very definite cycle of immunity which had a definite relation to the occurrence of arthritis. We know that if we inoculate a case of tuberculosis with tuberculin we get quite a marked reaction of the skin. The same is true to a less degree of certain other infections, including preparations made from the gonococcus. If we had a suitable extract of gonococcus and inoculated it under the skin, we would get in a case of gonococcal infection, a certain degree of reddening of the skin in much less degree than in the ordinary von Pirquet, but having a definite character Applying that test to intermittent hydrops, you get a very definite variation in the degree of skin-reaction from day to day Two or three days before the recurrence of the attack you get practically no reaction and then a little later after the attack has occurred and the knee is full of fluid you get an increased reaction, so that the reaction now is three or four times as great as during the low period If we take the blood from such a patient every day and test it for the complement-fixation for gonococcus, we get the same period of low ctivity A littl later when the joint appears to get better we get a positive complement-fixation, and these reactions can be shown to follow definite cycle corresponding to the recurrent cycle in hydrops. These findings possibly explain why we have recurrent hydrops. It is a question of immunity of temporary character which is stimulated by the recurrence of arthritis and subsides promptly Such a view fits in with the clinical cases of gonococcal infections. One attack does not protect against another attack. The cycle of immunity is there and is short, and these laboratory findings confirm that view It is characteristic of gonococcal infection. It is quite different from what we have in typhoid fever where the immunity develops more slowly

As far as the diagnostic value of the complement fixation test is concerned in these two cases, and judging from painful experiences in a large number of other cases which have been proved clinically, we should feel that the complement-fixation test in cases of gonococcal infection is unquestionably of decided value.

So far as the cutaneous test is concerned, it is of great value in tracing the curve of immunity It probably will never be of great value from the standpoint of diagnosis, because the number of exceptions must be considered.

DR. JOSEPH BIEHN read a paper (by invitation), entitled "Causes of Failure in Bacterin Therapy" (See p. 258.)

DISCUSSION

DR. IRONS I would like to emphasize the last paragraph of Dr Biehn's paper as to the indiscriminate use of the attempt to cover all forms of infections by specific therapy and to say that such a method is in great danger of bringing this form of therapy into entire disrepute. It is a method that any of us feel has definite possibilities and still greater opportunities for the future but requires careful study on the part of those who are using bacterins.

A MEMBER I would like to call attention to the use of nucleinic acid. We tried it in a number of cases and watched the leucocytosis to see if we got any reaction from it and I would like to ask the author of the paper if there have been any further laboratory contributions showing that nucleinic acid is of value, not from a clinical standpoint, which is sometimes misleading but from the standpoint of laboratory tests, either by examinations of the number of leucocytes or by their activity

DR. RITZ Perhaps this is an opportune time to try to elicit a little discussion among the members and guests as to their experience with a certain new product which is very actively advertised and more or less discussed in the periodicals but which is not eally a bacterin, but for which the most marvelous results have been claimed. I am speaking of so-called phylacogen. If there is any grain of truth in the vast amount of advertising literature that is being put out regarding this agent, I should like to have it tested.

It is claimed that the preparation of these phylacogens is not secret. It is claimed that it is positively demonstrable as to what goes into these phylacogens. The theory on which the treatment is built up is entirely fanciful. There is no scientific foundation for it. I cannot understand how anybody with any regard for his scientific conscience can be willing to use such a "gunshot prescription as these phylacogens are. Nevertheless, we hear of such wonderful successes from the use of phylacogen in certain diseases — and I would mention especially rheumatism and pneumonia — that it would be very interesting, aside from all possible theoretical foundations, to know how much of actual clinical facts have come to the knowledge of the members of this society I regret I am unable to make up my mind to experiment with this drug, this mysterious substance, but I have been an interested spectator in at least one case of puerperal pyemia in which a friend of mine gave phylacogen to the patient in the way advised by the firm preparing the substance and I wish to state that the outcome of that case was in no wise different from the way these cases usually end. That is to say after the patient had a considerable number of chills, and then phylacogen was administered, and she had some more chills, and phylacogen was then discontinued, and she had some more chills, she ultimately got well the same as we see any other cases get well that have had no treatment at all except alcohol, or hot or cold baths, or no douches, or some douches. In other words, without any treatment, I would like to know if any of the members have had experience with phylacogen. I would like to hear from any member and particularly from some one who has had a negative experience. We all know the opsonic treatment of puerperal infection has been a sad failure. I do not know of any series of cases treated according to the Wright method that show in any way anything better than we can accomplish by ordinary nursing I do not know of any series of cases in which any of the modern bacteriotherapeutic methods have given any better results than we usually accomplish to-day with ordinary nursing methods.

This is a subject of the greatest importance in view of the utter impotence which characterizes the eminent gynecologists and obstetricians in the presence of cases of puerperal sepsis, and it would be most desirable to make use of some of the successful methods of these modern investigations. If any one has had success I wish he would speak out loud and tell us. Speak of his failures, so that we may confirm our opinions.

Dr. Brenn (closing) As to the use of nucleinic acid, a sodium salt, it will positively increase the leucocytes. That can easily be demonstrated by a certain dosage. A thirty-five-pound dog can be given as high as half a gram a day and unless we keep it up and maintain a threefold increase of the leucocytes, at the end of ten days you have the leucocytes in the peripheral circulation. But if you go over that dose, you have a leucopenia.

As to whether the leucocytes are of any value or not, laboratory experience in my mind does not show that they are any more active than the other, but I believe they are an advantage.

If I may answer the question of Dr Ries I will say that if you believe Allen, of England, he has never lost a case of puerperal sepsis or septicemia because he has always given them bacterins, and they recover on the thirteenth day

Prophylactically the typhoid bacterin has been proven of value and that has been clearly established. It will at least modify the disease, if not prevent it. It does not prevent it in animals, but that is no criterion, because we can easily protect the laboratory animals from that particular strain.

I do not agree with the doctor that bacterins are not of any value. They are of value.

Dr. Ries I did not speak generally

Dr. Brenn The phylacogens are bacterial toxins and will be called such before long. I used phylacogen in the case of the wife of a member of this society She had rheumatism. He called me up and said he had used everything without beneficial effect. I told him I had used phylacogen with apparent success in two cases, but with failure in two others. He injected only one-half of the dose which is advised, and called me up about three o clock in the morning because his wife had developed an exceedingly violent toxic nephritis. He had an awful time with her but she pulled through, although she still has albumin and casts, and it is some three months now She was given a second dose and it did not affect the rheumatism in any way yet I have had apparently successful results in two cases of rheumatism.

BOOK REVIEWS

Der Infantilismus, die Asthenie und deren Beziehungen zum Nervensystem. By Prof. Paul Mathes, M. D Berlin S. Karger.

In this book the author endeavors to establish the fact that infantilism and asthenia are not identical, as some authors have declared and in the discussion of cases according to preponderance of symptoms and signs uses the names asthenic infantilism and infantile asthenia in describing them.

Anatomical conditions ("Hemmungsbildern") and the time of their appearance during the development of the individual are considered.

The author differentiates disposition toward disease (disease resulting from exogenous and endogenous influences) and "constitution" (organic law handed down from the parents)

In his observations from year to year of growing boys the author concludes that the lack of development in stature of different portions of the body depends upon the time at which the retardation of growth occurred, the part affected being the part which at that particular time was in active growth.

In the discussion of infantilism of the skeleton the author describes the spinal curvatures as due to the unequal development of the ventral and dorsal portions of the vertebræ the phthisical chest as being due to lack of development of the first rib. Infantilism of the genitalia is also fully discussed, as well as the status lymphaticus and other diatheses. Asthenic enteroptosis and prolapse with the time of their most frequent occurrence are also fully dealt with. The second part of the book is a study of the clinical manifestations embracing mental depression, especially before menstruation, and the physiological pathology of the sympathetic nervous system.

The book is clearly and forcefully written, showing the author's profound study of many cases and the logical conclusions drawn from them It is a work which merits careful translation into English.

H. A Porter

Electricity in Gynecology By May Cushman Rice The Practical Uses of Electricity in Diseases of Women Second Edition Chicago L I Lang & Co.

This book is intended to supplement a course in electrotherapy Anatomy and physics are omitted The handling of electrodes with the technique of their preparation and use is described in detail for the purpose of assisting those already familiar with the principles involved in treating patients by electricity These details are concisely set forth and with a moderation in results claimed unusual in a book of this nature. This is particularly evident in the chapters on uterine fibroids and on the use of the rontgen ray in carcinoma.

Golden Rules of Surgery. By Augustus Charles Bernays, A. M., M. D M. C. R. S. Second edition, revised and rewritten by William Thomas Coughlin, M. D St. Louis. C. V Mosby Company 1913.

This little book consists exclusively of short, positive assertions, the text being classified so as to include chapters on such subjects as sepsis and asepsis, anæsthesia, shock, the operating room, general pathological conditions, and regional surgery The two closing chapters are on "Scientific Contributions to the Literature of Medicine and Surgery and Science and Surgery

One can truthfully say that there are incorporated in this brief work many excellent suggestions on surgical diagnosis and technique which, although at times owing to their positiveness might be questioned, yet for the student and general practitioner are quite in place, and will impress the reader with their importance. The chapter on "Anæsthesia, although short, is very good.

In the chapter on "Scientific Contributions to Literature the author displays a certain amount of egotism, which not only detracts from the beauty of the sentiment with which he is endeavoring to impress the reader but rather embarrasses one's æsthetic sense.

The skilled surgeon as well as the general practitioner will find this little work not only profitable but a pleasant evening's entertainment.

J A. Wolfer.

Health Through Rational Diet By Arnold Sorand M. D Carlsbad. Philadelphia F A. Davis

In this book we have a most interesting and instructive lesson as regards the rational use of foods Food is considered from every standpoint: first, as to its content of albumins, carbohydrates, and fats and then as to the value of its salts with particular reference to phosphorus, iron and potash. It is considered as to its energy-producing qualities and the tissue rebuilding.

Food values necessary in the different climates, in the different occupations, and in the different ages are all carefully considered The relative merits of vegetarianism as opposed to a rational diet are carefully analyzed and the advantages of each clearly told Food values in relation to sexual

power and reproduction are also considered to some extent.

The translation is beautifully made and the book is read ith an ease quite unusual in most books of this type W. K. Cleaves.

Epidemic Cerebrospinal Meningitis By Abraham Sophian M D St. Louis C. V Mosby Company 1913

Monographs of this type are welcomed chiefly by the ever-increasing class of medical men who desire to have at hand more detailed and fresher information of the advances in a definite field than can be obtained in the various systems of medicine. Cerebrospinal meningitis has in late years been the subject of much productive investigation hich has yielded such valuable results both in diagnosis and in therapy that collective report such as that embodied in this volume should meet with a warm elcome.

The author is exceptionally qualified for the presentation of this material, his association with the Research Laboratory of New York where h carried out his own investigations on the bacteriology and serum reactions of the meningococcus enabling him to speak ith intimate knowledge of this aspect of the subject hile his experience in the Texas epidemic of 19 yielded him a large series of observation f the epidemiological character and of the therapeusis of this disease

The chapter on etiology after a rather unnecessarily detailed historical preface takes up the epidemiological aspects of cerebrospinal meningitis. The author by an analysis of the history of the chief epidemics, is led t the conclusion that the most common predisposing geat r is a period f sudden limatic changes leading t bleispread occurrence in the community of nasopharyngeal catarrh Of 85 epidemics in the U S up to 87 37 raged in winter 8 in inter and spring and 3 in spring. The introduction of irulent strai of meningococci, probably carried over by healthy person from a previous epidemic or carried from recent epidemic in another country then m y lead to the development of an epidemic

The virulent strain of meningococcus may be merely implanted on pre-existing nasopharyngitis or be the chief cause of the nasopharyngitis. The portal of entry is at all events most probably alway the nasopharynx I only ertain cases, however does further extension occur Dopter tates that it is really an epidemic of rhino pharyngitis w th which one deals — an epidemic complicated at times by meningitis hich develops in umber of persons ho are susceptible of cerebral invasion.

That the proportion of these susceptible cases is comparatively small is shown interestingly by the number of carriers found by bacteriological examination of the nose and throat f those who ha come in contact with meningitis cases Statistics of carrier studies in various epidemics have shown as high as 70 per cent of contacts to be meningococcus carriers.

The presence of these carriers is considered by the author to be the chief factor in the dissemination of the disease. The closing of schools and the forbidding of large gatherings are logical preventive measures. I Houston in 91 the visit of well-known evangelist was followed t once by a large increase in the incidence of meningitis cases. The author points out the importance f systematic examination of the nasopharynx of all members f a family in which a case has occurred and the maintenance of quarantine until negative cultures are obtained. The methods of procedure are given at some length

I this connection also valuable help is afforded by the discussion under the bacteriology of the meningococcus, of the other members of the gram-negativ group of cocci since ll of these may be encountered in throat cultures Their differentiation by cultural characteristics is usually satisfactory Of the various specific serum reactions Sophian considers the complement-fixation test with McNeil's specific meningococcic antigen to be at present the most reliable

Under the symptomatology of the disease the uthor divides the acute form into an accumulative and a acti stage. I many cases during an epidemic there is not the classical acute onset but an appreciable period of more or less definite prodromal symptoms These, Sophian considers, correspond to the in asion of the general circulation by the meningococci from the nasopharynx with multaneous beginning irritation of the meninges and accumulation of cerebrospinal fluid A history of exposure, fever headache repeated explosive omiting herpes petechia, photophobia, dilated, sluggishly responding pupils, tenderness at angle of jaws bulging fontanel, irregular pulse or respiration significant grouping of these may occur before the outbreak of more evident symptoms of meningitis In no disease is early diagnosis of more alue to the patient

Flexner in recent article on the causation of certain accidents in the subdural injection of antimeningitis serum, speaks of Sophian as having had the largest personal experience in this country th the administration of the serum We are prepared therefore to find as we do an unusually full and instructiv discussion of this feature of the therapy The use of simultaneous blood pressure determination in controlling the amount of serum injected is strongly and convincingly advocated as ell as the use of the gravity method of injection in all except such cases ha ery thick plastic exudate Prophylactic and therapeutic use of antimeningococcus serum is new field for hich the uthor claims attention

The most serious defect in the book is the lack of a bibliography The insertion of detailed quotations from the ork of many men presupposes type of

reader to whom some means of ready access to the original articles is due

The lack of any attempt to describe the pathology of the disease is also unfortunate since it means that the book must always be supplemented and cannot serve as a complete reference to its subject.

M. C. Proctor

Vicious Circles in Disease. By Jamieson B. Hurry, M.A., M.D. (Cantab.). Second edition. London. J. & A. Churchill, 1913.

The author explains in his introduction that by the term "vicious circle" is meant a morbid process in which two or more disorders are so correlated that they reciprocally aggravate and perpetuate each other. He regards these circles as playing an important rôle in pathology, though his material, as here formulated, is entirely clinical. His effort is to discuss intelligently the pernicious influence on the progress of disease which these circles possess, as well as the large part the *vis medicatrix* plays in breaking the circle. Vicious circles are first classified into what may be termed their natural orders, several examples from each order being presented.

The various systems of the body are then taken *seriatim* so that attention may be drawn to diseases which are liable to this complication. The principal etiological factors are discussed in a special chapter. Emphasis is next laid on the necessity of breaking the circle before recovery can take place, instances being given to show how this is accomplished both by nature and by art.

The author's aim is to give a clearer insight into problems of pathology and of rational therapeutics. Most of his material has previously appeared in the columns of the *British Medical Journal*, *The Lancet*, *The Practitioner* and *The Medical Press*. In general, the volume presents a definite practical value and reveals a marked philosophical tendency and a mild-Victorian condition on the part of the author.

The Modern Hospital — Its Equipment, Its Architecture, Its Economics, Its Operation. By John A. Hornsby, M.D., and Richard E. Schmidt. Philadelphia: W. B. Saunders & Co. 1913.

This very comprehensive volume is somewhat of a pioneer as there is a dearth of literature upon the subject of modern hospital financing, building and management. The collaboration of physician and architect in the preparation of this book has given us a valuable guide to the whole hospital question whether it is designed to construct and operate a municipal or private hospital. In the introduction the authors discuss the general hospital, its division into three classes, viz., charitable, part for pay patients and part for charitable ones, and one accepting pay patients only.

Considerable space is given to financing. Plans, arrangement, details of structure, permanent installation, etc., are fully considered.

The equipment of the complete hospital as regards diet kitchens, supplies, operating rooms, instruments, laundry, etc., is fully considered, and everything regarding the building and management of the hospital is advocated which makes for efficiency, economy and care of patients. H. A. Potts.

Reproduction in the Human Female. By James Young, M.D., F.R.C.S. (Ed.). Edinburgh and London. William Green & Sons.

The investigations upon which this work is based were carried out in the Royal Infirmary and in the laboratory of the Royal College of Physicians, Edinburgh. They comprise an account of the structure of the uterine mucous membrane and the functional changes which it undergoes during menstruation and pregnancy.

The structure of the uterine mucous membrane is first described in accordance with the most recent knowledge, particular emphasis being given to the conformation of the interstitial connective tissue. The author takes an advanced position relative to the structure of the tissue network of the stroma. Many early observers regarded this method as a structural entity completely independent of the stroma, but Dr. Young attempts to show that the cell cytoplasm has been drawn on to furnish the material of which the network is formed. Again in discussing the nature of the blood supply to the corpus mucosa, he goes further than to say that blood is carried through special endothelial capillaries, affirming that the so-called blood-vessels of the endometrium are in reality simply undifferentiated tracts through the stroma. "In none of the specimens is there any evidence of muscle fibres, or elastic tissue in any part of the uterine stroma except that adjacent to the muscular coat. Where the vessels require extra support they derive it through condensation of the neighboring tissue cells." The blood vessels, in other words, have no specialized wall, but consist merely of tracts or channels through the soft stroma protoplasm, by means of which a rich supply of blood is carried to every part of the mucous membrane. He further agrees with Leopold and Webster that the intercellular spaces in the stroma are filled with lymph.

Following rather closely in the footsteps of Hitschmann and Adler the chapter devoted to menstruation describes the four steps of premenstrual swelling, bleeding, repair and quiescence. The subject is carried beyond mere statement of observations, however, into an elaborate argument as to the significance of the changes now well recognized. As a result of this certain definite and advanced theories are maintained. Thus, in defining the true nature of the mucosa in terms of the functional changes which it exhibits, Young designates it not merely as a spread-out lymph surface, such as Leopold named it, but as a potential blood sponge. Again, with reference to the causation of blood escape in the normal menstruating uterus, an interesting bit is thrown out as to the etiological

factor in certain forms of menorrhagia. Dr. Young believes that the cause of oedema and hemorrhage in the normal mucosa is due to factors identical in nature with, and differing only in the degree of activity from, those operating in certain abnormal conditions, in which case additional support is contributed to the idea that many cases of menorrhagia and metrorrhagia are directly secondary to an abnormal activity of the ovarian influence.

Chapters three and four explain the embedding of the ovum comprising phenomena now well understood. The intra- and extrachorionic activities of the fœtal epithelium and the mode of opening up of maternal vessels and of the formation of blood sinuses is described in detail. Some consideration is given also to the question of placental fragments and to chorio-epithelioma. The author maintains that an escape of blood by merely mechanical means from a broken-down vessel wall does not suffice to explain the manner in which the fœtal elements derive their nourishment. Hence he speaks of 'chorionic influence' which in some way or other determines the occurrence of protoplasmic changes in the cells, which lead to their imbibing fluid which can often be seen to have accumulated in the cell body under a hydrostatic tension clearly higher than the pressure of the intravascular blood and of the fluid in the surrounding tissue spaces.

The Teacher Bryce ovum and those of Peters of Jung, and of Leopold are briefly described, followed by a detailed report of the author's own specimen. For this he estimates a age of 13½ to 14½ days, thus placing it between the Teacher-Bryce and the Peters ova in measurements.

The nature of the chorionic influence and the mode of its spread is discussed briefly without, however the development of any very definite theory as to its chemistry. The changes taking place in the endometrium in the formation of the decidua are entered upon in detail, as is a discussion as to the functions of this membrane. Concerning this function the author says:

The function of the decidual membrane is t prevent an irregular and increasing opening-up nd expansion of the maternal vessels and tearing up of the mucosa by fluid and blood after the tissue changes necessary for an adequate supply of the maternal blood for the engrafted ovum have been accomplished. It is by virtue of this action that the chorionic invasion of the tissue is limited and that the increase in the implantation chamber is prevented by an erosion or displacement of tissue.

In some respects the most important feature of this volume is the collection of plates and microphotographic reproductions. These are excellent in character abundant in number and unusually well reproduced. They not only serve to render the text more understandable—of definite value in a work of such speculation as this—but, to those familiar with the more recent studies in placentation, such reproductions are of greater value than any teacher's theories.

In stating that for the first time it is shown that the structural conformation of the uterine mucosa is intimately bound up with menstruation and with the processes associated with fœtal nutrition the author apparently claims vermuch, considering alone Webster's very fundamental work on placentation in 1901 and the exposition of Hitschmann and Adler's research in 1907. Yet, coming at this time, the present volume shows genuine research and is of a definite value as an addition to the literature of the subject. While the author goes beyond mere demonstration of findings and attempts to establish advanced theories, it must be said that his theories reveal scientific imagination. In most respects they are logical in their deduction and attractive in their presentation.

CAREY CULBERTSON

MUSCLE SPASM AND DEGENERATION IN INTRATHORACIC INFLAMMATIONS AND LIGHT TOUCH PALPATION. By Francis Marion Pottenger A. M., M. D. LL. D., Medical Director of the Pottenger Sanatorium for Diseases of the Lungs and Throat, Monrovia, Cal. St. Louis: C. V. Mosby Co., 1912.

This volume is designed to promulgate, according to the author' methods and observations our knowledge regarding the diagnosis of diseases of the thoracic organs. He lays great stress upon inspection and palpation, especially light touch palpation, which methods have heretofore not been recognized as being of especial value as diagnostic aids in intrathoracic diseases. According to the observations and studies by the author those diseases when acute produce a spasm of overlying muscles which degenerate when the process becomes chronic. Even in degenerated muscle spasm is produced by an acut exacerbation of a chronic process, as frequently is the case in pulmonary tuberculosis. Many of the facts presented are not new and the only claim the author has to originality is that he has worked them out as an independent observer and has applied them to clinical cases to his own satisfaction as to their diagnostic aids.

The wthor discusses the cause of this degeneration further outlining what ca be determined by noting the condition of the neck and chest muscles in acute nd chronic inflammations of the lungs and pleura as well as the relation this muscle change bears to the bony anomalies of the upper thorax.

The light touch palpation and the application of it in the deflineation of the deep-seated organs is distinctly the author's, and if it can be developed by the average diagnostician t the degree which the author has ttained it will mark distinct advance in clinical diagnosis.

H. A. POTTS

SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME XVIII MARCH 1914 NUMBER 3

THIRTEEN YEARS EXPERIENCE WITH PYLOROPLASTY[1]

A STUDY OF OVER HUNDRED CASES

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and
JULIUS FRIEDENWALD M D BALTIMORE
Professor of Gastro-Enterology College of Physicians and Surgeons

IT is now over twelve years since the operation of pyloroplasty was first introduced by Finney who at the annual meeting of the American Surgical Association in 1902 described the operation and reported five successful cases. It seemed to us, therefore that it would not be out of place after this period of time to bring together the results of this operation and discuss the advantages or disadvantages of this procedure over others performed for a similar purpose, and to draw as far as possible, definite conclusions regarding its indications and value as a surgical procedure. In gathering our experiences, we deem it most important that not only should the immediate effects be noted, but also the final results, i e the results obtained after a term of years.

The special operation of pyloroplasty consists in a horseshoe-shaped incision through the pylorus, extending down through the anterior walls of the duodenum and the stomach, after they have been approximated, and sutured much as in a lateral anastomosis. Since this time Narath, Jaboulay Henle, Kocher and others have described similar methods or modifications of this operation, but none of these present any material advantage over the original method. The operation may be described as follows. Adhesions binding the pylorus to neighboring organs should be thoroughly freed, as well as the pyloric end of the stomach, and first portion of the duodenum.

The thoroughness with which the pyloric end of the stomach and the upper end of the duodenum are freed determines largely the ease and success of the operation. Much advantage is gained from this so-called mobilization of the duodenum. Kocher later emphasized the great importance of this procedure. A suture to be used as a retractor is taken in the upper wall of the pylorus, which is then retracted upward by means of this suture. A second suture is then placed in the anterior wall of the stomach, and a third in the anterior wall of the duodenum at equidistant points from the suture just described in the pylorus. The second and third sutures are taken as near the opposing free borders of the stomach and duodenum as possible, and mark the lower ends of the gastric and duodenal incisions respectively.

Traction is then made upward on the pyloric suture and downward in the same plane on the gastric and duodenal sutures

[1] Read before the Clinical Congress of Surgeons of North America, Chicago, November 1913.

This keeps the stomach and duodenal walls elevated and taut, and allows the placing of the subsequent sutures with greater facility than if they remained retracted and relaxed. The peritoneal surfaces of the duodenum and stomach along its greater curvature, are then sutured as far posteriorly as possible. For this row the continuous silk suture is to be preferred.

After the posterior line of sutures has been placed and tied an anterior row of mattress sutures is taken which are not tied. These sutures after they have been placed are drawn aside, thus exposing the line of incision.

After all the anterior stitches have been placed and retracted the incision is made in the shape of a horseshoe. The anterior and posterior lines of sutures should be placed far enough apart to give ample room for the incision to be made between them. Beginning in the gastric wall, the incision is carried upward to and through the pylorus, and around into the duodenum. Hemorrhage is then stopped. Scar tissue or active ulcers present in the gastric or duodenal anterior wall may be excised through this incision.

Those in the posterior wall we have been treating of late just as other chronic ulcers i.e. excising the overhanging edges of mucous membrane and incising the dense fibrous base care being exercised to avoid perforation of the posterior wall of the stomach and to stop all hemorrhage by ligature or suture.

The opportunity thus afforded to explore digitally and inspect the ulcerated area and then excise it through this incision is in our judgment one of the strongest points in favor of the operation.

A continuous catgut suture is now taken through all the coats of the stomach and duodenum on the posterior side of the incision in order to reinforce this line of sutures. The anterior sutures are then straightened out and tied, and the operation thus completed. The mattress sutures may be reinforced with as many Lembert sutures as may be thought best. All the stitches are thus placed and the posterior row tied before the bowel is opened, and it remains open only long enough to control the hemorrhage and excise any ulcer that may be present, thus giving the minimum of exposure of infected surfaces.

The size of the newly formed pylorus may be made as large or small as desired Unless the stomach is very much dilated or has descended to an unusual extent, the lower limit of the new pylorus will be found to be at or near the level of its most dependent part.

We have studied the records of 100 cases in which the operation of pyloroplasty has been performed, covering a period dating from 1900 to the present time. Of these the immediate results were noted in all cases the remote results in 78 cases.

In analyzing our results we note that the largest proportion of cases in which pyloroplasty was performed occurred between the 35th and 50th years.

TABLE PRESENTING CASES ARRANGED ACCORDING TO AGE

Years	No	Per Cent	Years	No	Per Cent
20– 5	5	5	45–50	5	5
5 30	9	9	50–55		10
30–35	9	9	55–60		
35–40	20	20	60–65	3	3
40–45	14	14	65 70	4	

Of the total number there are 63 males and 37 females. The following tables illustrate the number of cases observed in males and females according to age

CASES GROUPED ACCORDING TO AGE AND SEX

Years	Males		Females		Total	
	No	Per Cent	No	Per Cent	No	Per Cent
20– 5			4	4	5	5
5–30	4	4	5	5	9	9
30–35	7	7			9	9
35–40	9	9		11	20	20
40–45			4	4	14	14
45–50			5	5	5	5
50–55	10				10	10
55–60	9	9				11
60–65					3	3
65–70			3	3	4	4
Total	63	63	37	37	100	00

The duration of the symptoms in our cases varied greatly ranging from one and one half months to twenty five years the average duration being nine and a half years. The following table presents the cases grouped according to the duration of symptoms

CASES GROUPED ACCORDING TO DURATION OF SYMPTOMS

Time	No of Cases	Time	No of Cases
½ months		4 years	
months		5 years	8
months		6 years	3
months	5	9 years	
8 months	4	1 years	6
9 months		1 years	1
months		1 years	3
year	5	15 years	
½ years	5	7 years	
years	9	10 years	5
years		5 years	
3½ years			

Average duration of symptoms, 9½ years, 8½ years in males, and years in females.

We have noted the principal symptoms observed in both males and females at various ages. Of these pain was observed in 92 per cent of cases (58 males and 34 females) vomiting occurred in 64 per cent of cases (44 males and 20 females) hæmatemesis in 21 per cent of cases (15 males and 6 females) melæna in 46 per cent (29 males and 17 females) retention in 42 per cent (27 males and 15 females)

TABLE PRESENTING THE PRINCIPAL SYMPTOMS ARRANGED ACCORDING TO THEIR OCCURRENCE AT VARIOUS AGES

Age	Pain			Vomiting			Hæmatemesis			Melæna			Retention		
	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total
10–30	4	9	13	3	5	8				2	3	5	3	4	7
30–40	13	8	21	7	7	14	4	2	6	7	7	14	6	5	11
40–50	9	5	14	4	5	9	1	1	2	3	3	6	4	3	7
50–60	8	3	11	6	1	7	1	0	1	6	2	8			9
60–70	2	2	4		1	1				1		1	3		3
Total	36	27	63	20	19	39	6	3	9	19	15	34	16	12	28

In the following table we have arranged the cases of gastric and duodenal ulcers according to age and sex There are 55 cases of gastric ulcer (36 males and 19 females) and 32 duodenal ulcers (21 males and 11 females) making a total of 87 cases. In addition pyloroplasty was performed upon two cases for gastroptosis in three for pylorospasm and six for pyloric stenosis, due to adhesions (one due to cholelithiasis, four due to adhesions of undetermined cause and one to closing of a former gastro-enterostomy opening) Two cases presented both gastric and duodenal ulcers.

TABLE GROUPING THE GASTRIC AND DUODENAL ULCERS ACCORDING TO AGE AND SEX

Age	Males		Females	
	Gastric No.	Duodenal No.	Gastric No.	Duodenal No.
10–30	4		4	
30–40		5	8	4
40–50		6	4	3
50–60		8		
60–70		1		
Total	36		9	

Of the 87 cases, obstruction of the pylorus occurred in 64 instances.

The obstruction was due in 51 cases to gastric ulcer [1] in 7 to duodenal ulcer and in 6 to adhesions, probably resulting from healed ulcers. There were four cases requiring secondary operations (gastro-enterostomy)

TABLE ILLUSTRATING CASES REQUIRING SECONDARY OPERATION—GASTRO-ENTEROSTOMY

Age	Sex	Cause
58	F	Pyloric obstruction due to adhesions produced by gall-bladder infection, eleven years after the pyloroplasty
3	M	Duodenal ulcer formed five years after pyloroplasty
43	M	Infected sutures causing immediate obstruction at site of pyloroplasty requiring gastro-enterostomy after five days.
4	M	Duodenal ulcer after one and one-half years

In one case there occurred a pyloric obstruction due to adhesions produced by cholecystitis eleven years after the pyloroplasty In the second a duodenal ulcer formed four years after the pyloroplasty In the third, infected suture (linen thread) caused early obstruction at the site of the pyloroplasty and in the fourth a duodenal ulcer formed after a year and a half In all of these cases secondary gastro-enterostomies had to be performed, which gave entire relief

In both of the cases where a duodenal ulcer recurred an attempt had been made, at the original operation, to excise a duodenal ulcer but owing to the fact that it was so situated that it could not be entirely excised It is more than probable that in one of the cases, at least, it was a direct recurrence. In the

[1] While the history states positively in 51 cases that the obstruction was due to gastric ulcer and in only [illegible] duodenal ulcer, it is possible that in the earlier cases where we did not examine as carefully as now the error may have been made in certain cases of existing duodenal gastric ulcer but we cannot believe that the error was very large.

other the second ulcer appeared to be so far removed from the site of the first, as to give the impression, at least, that it was an independent ulcer

The following table illustrates the immediate results of pyloroplasty of the 100 cases, consisting of 63 males and 37 females the operations proved satisfactory immediately in 57 males and 33 females (90 per cent) and unsatisfactory in 6 males and 4 females (10 per cent) The post operative nausea and vomiting was almost entirely absent in most instances. In but five cases was there nausea or vomiting to any marked degree following operation. Vomiting occurred in two cases eight and twelve days after operation respectively but this was due in each instance to gross errors in feeding The great freedom from discomfort following immediately after operation is also to be noted as a distinct advantage of this procedure. In but seven instances were the patients greatly disturbed by nausea flatulency or distention, and the immediate results of this operation may be favorably compared with those observed after appendectomy when performed between attacks, being attended with almost as little discomfort. Diarrhœa after operation appeared in five instances, mainly however after the first week or ten days, and was usually due to errors in diet. Inasmuch as the operation is performed in most instances upon patients affected with pyloric obstructions, and often after having this condition for years, it is easily understood how on account of the rapid passage of the gastric contents through the stomach, a weakened intestine may be overtaxed and intestinal indigestion and diarrhœa be induced. On this account, as well as because the stomach has in most instances temporarily lost its tone, and inasmuch as in some instances portions of ulcers have not been entirely resected due to their location and extent, we have found it advisable to regulate the diet following immediately upon operation and continuing on for several months according to the following plan which has been found very satisfactory

For two days after operation nourishment is administered only by means of rectal alimentation *Normal salt solution or plain* water after Murphy's method, is begun immediately after operation, with nutrient enemata at intervals of every four hours on the second and third days. On the third day after operation egg-albumin is given in teaspoonful doses, gradually increased to one half ounce every two hours on the fourth day and two ounces on the fifth day On the eighth day any liquid is permissible, and on the eleventh day the patient is given a soft boiled egg on the thirteenth, soft diet on the fifteenth very restricted light diet on the sixteenth a restricted light diet on the eighteenth day light solid food Small quantities of water at a time are allowed by mouth after 24 hours

DIET LIST FOLLOWING THE OPERATION OF PYLOROPLASTY

First day first 12 hours, nothing by mouth nutrient enemata every 4 hours, alternating with continuous salt solution by Murphy's method.

First day second 12 hours, water in dram doses.

Second day increase water gradually up to 1 ounce every two hours

Third day water 1 ounce alternating with albumin, 1 dram. Gradually increase quantities of each until

Eighth day any liquid 2 ounces every two hours.

Ninth day any liquid, 3 ounces every two hours.

Tenth day any liquid 4 ounces every two hours (discontinue rectal feeding)

Eleventh day on soft boiled egg in addition to any liquid.

Twelfth day two soft boiled eggs in addition to any liquid

Thirteenth day soft diet

Fourteenth day soft diet

Fifteenth day very restricted light diet.

Sixteenth day restricted light diet

Seventeenth day restricted light diet

Eighteenth day any digestible solid food

After the eighteenth day the following diet list may be gradually followed, and should be continued for at least four or five months Soups any light soup. Meats any

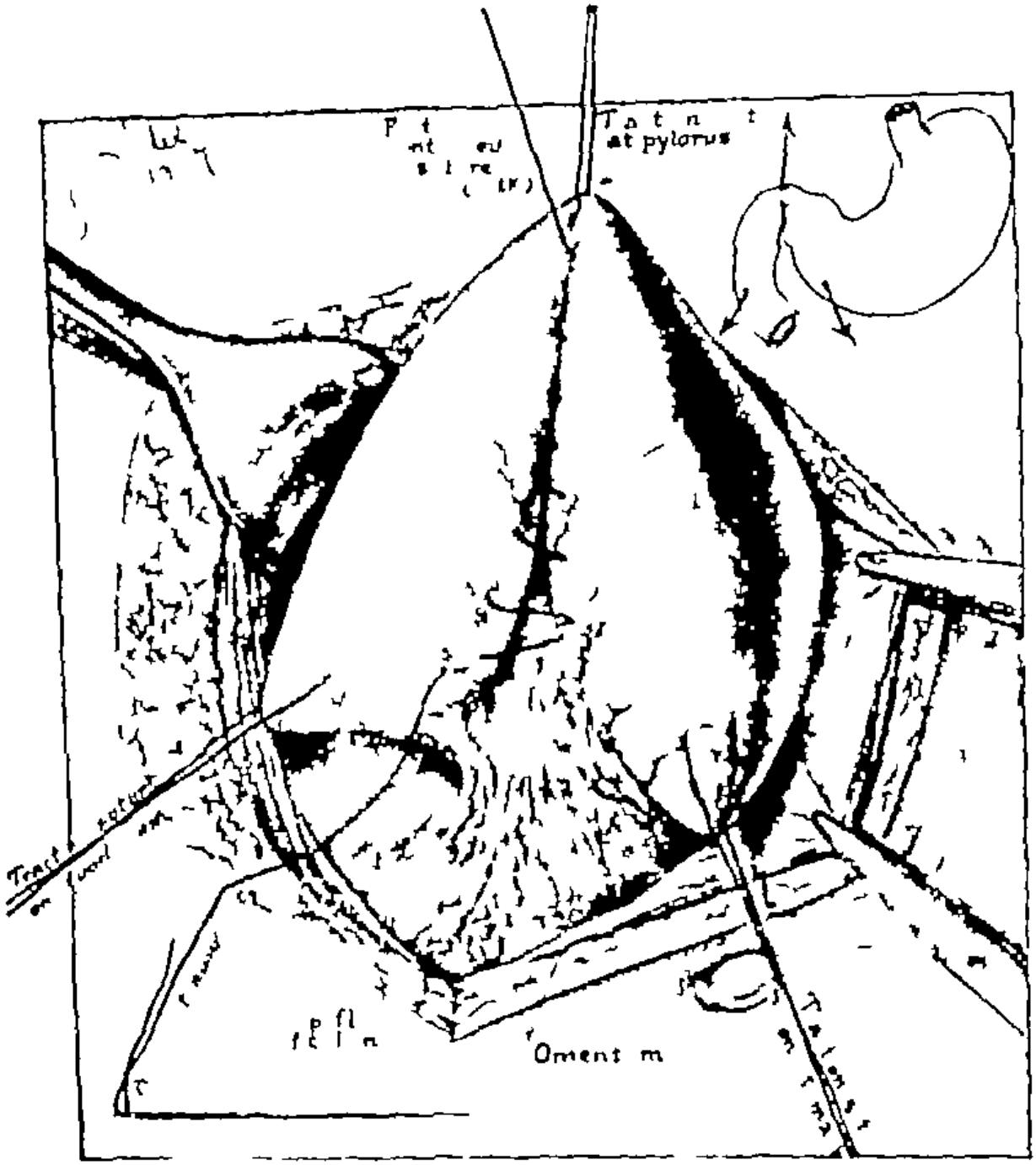
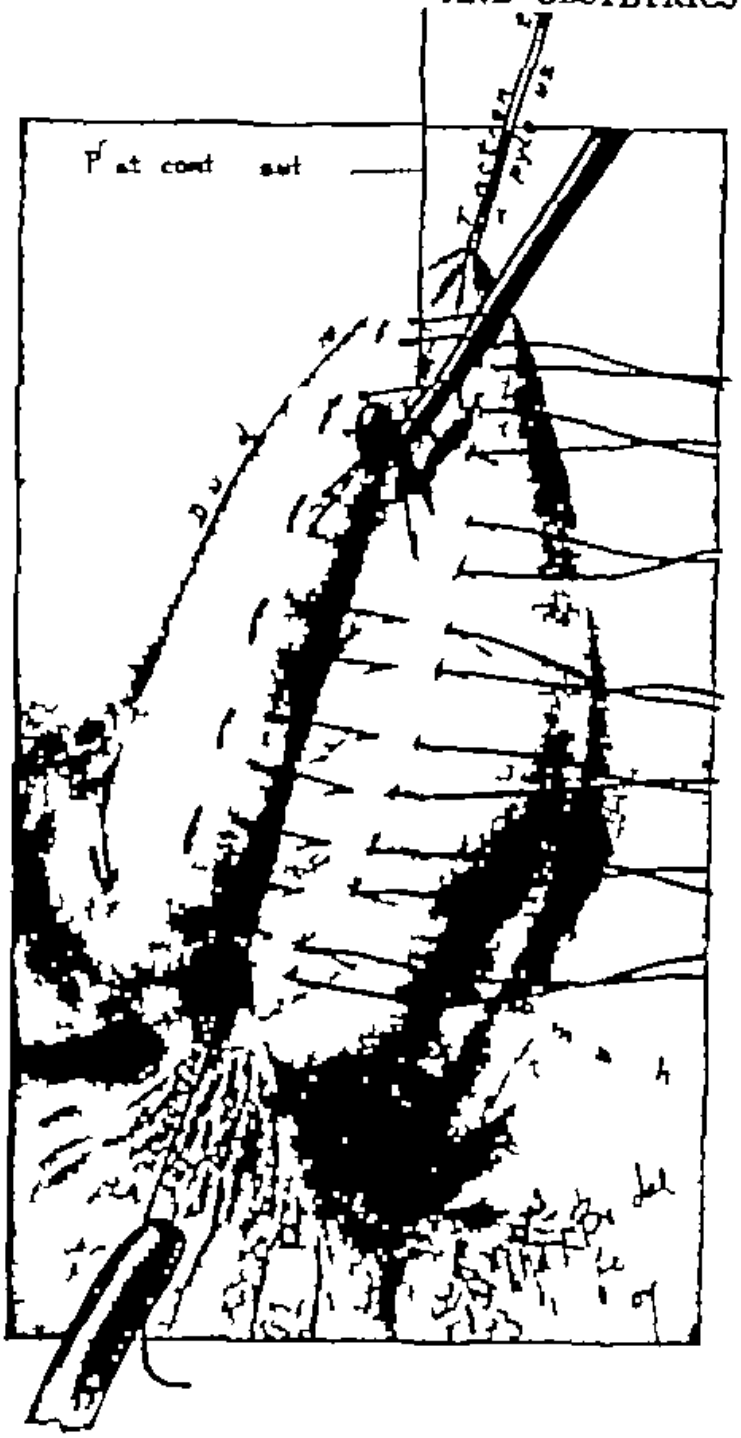


Fig. ... showing traction sutures in pyloric stomach, and duodenum. Posterior line of suture nearly completed. Finney in Kelly and Noble, Gynecology. (Fig. III. Knoll, preparation. W. modified.)

the easily digestible meats as brain sweetbread beef mutton lamb or poultry best minced and taken either broiled or boiled. Fish mainly the white variety as mackerel rock bass as well as oysters (boiled or broiled). Eggs in any form except fried. Vegetables best taken mashed and strained the easily digestible forms as asparagus, spinach pea bean potatoes carrots. Farinaceous food any of the cereal bread to be taken stale. Dessert any of the light puddings. Fruits mainly stewed. Fatty food cream butter and olive oil. Drinks milk, buttermilk cocoa carbonated mineral waters and plain water.

The following must be avoided. Rich soups fried food pork veal stews hashes, corned meat potted meat twice cooked



Plat Posterior continuous suture placed and tied Ends left long as retractors Anterior row of mattress sutures placed but not tied Fenney in Kelly and Noble Gynecology Vol II Kneely presented by W B Saunders Co

meat, liver kidney duck goose, sausage crabs, sardines, lobster preserved fish smoked fish, salted fish, salmon, cauliflower celery radishes cabbage, cucumbers, sweet potatoes, tomatoes, beets, corn, salads, bananas, melons, berries, pineapple hot bread or cakes, nuts, candies, pies, pastry preserves, cheese, strong tea, strong coffee, alcoholic stimulants.

IMMEDIATE RESULTS

Age	Males		Females	
	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory
20–30	5		7	
30–40	5		8	
40–50	19			
50–60	16	3		
60–70			4	
	—	—	—	—
Total	57	6	33	

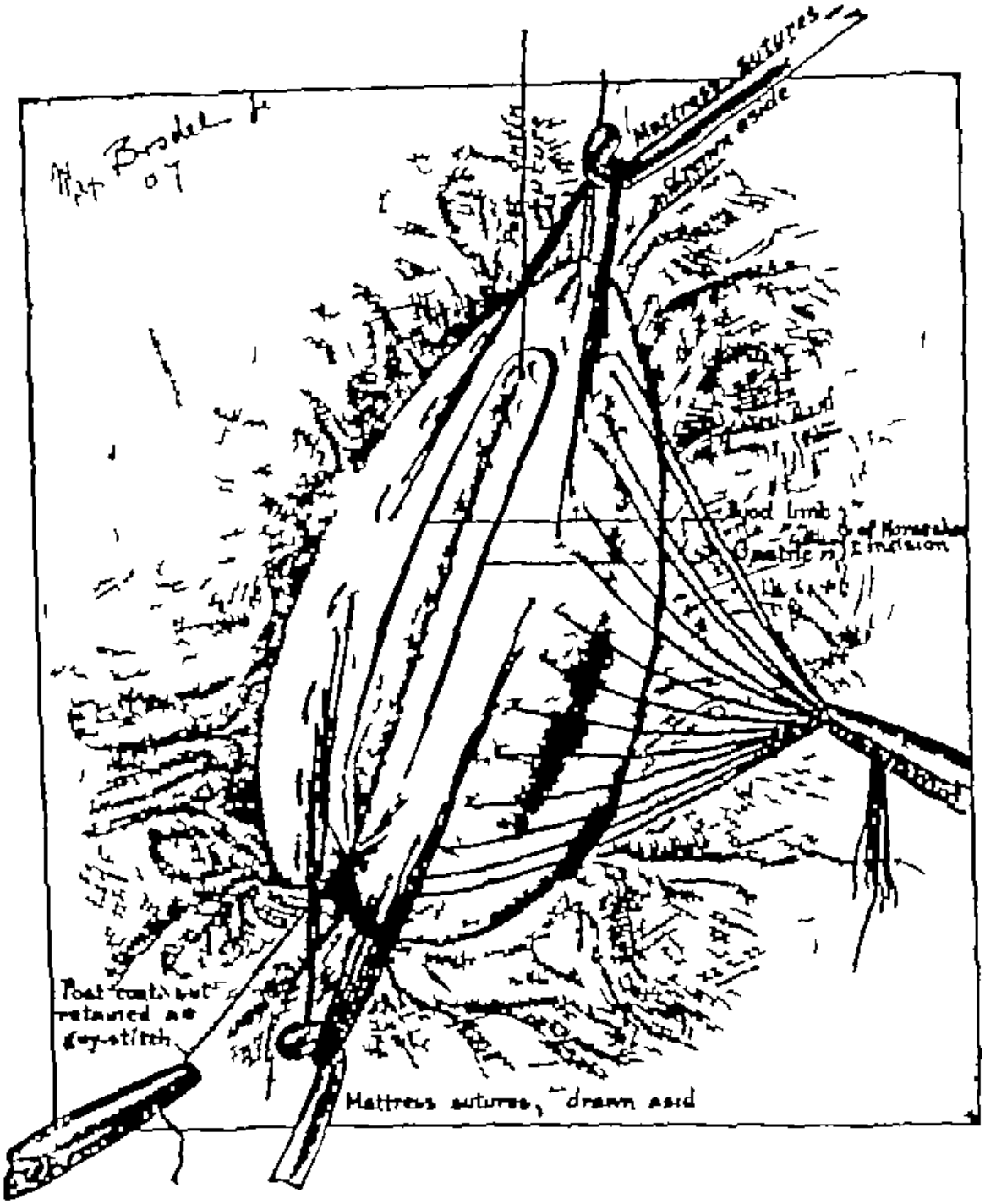


Plate 3 Anterior mattress sutures retracted Incision completed through the anterior gastric and duodenal walls Finney in Kelly and Noble Gynecology Vol II Kindly presented by W B Saunders C

In order to obtain a clear view as to the immediate results of the operation we have compared the gastric secretion, in the following four cases of pyloric stenosis due to ulcer before the operation with that obtained one and two months after operation. The figures given are an average of a number of examinations. The total acidity is first noted then the amount of free hydrochloric acid, and finally the quantity of contents recovered which in a measure represents the motor activity of the stomach It is evident in every case that the total quantity of acid as well as the percentage of free hydrochloric acid, which may be exceedingly high before operation, is gradually reduced to normal but that this does

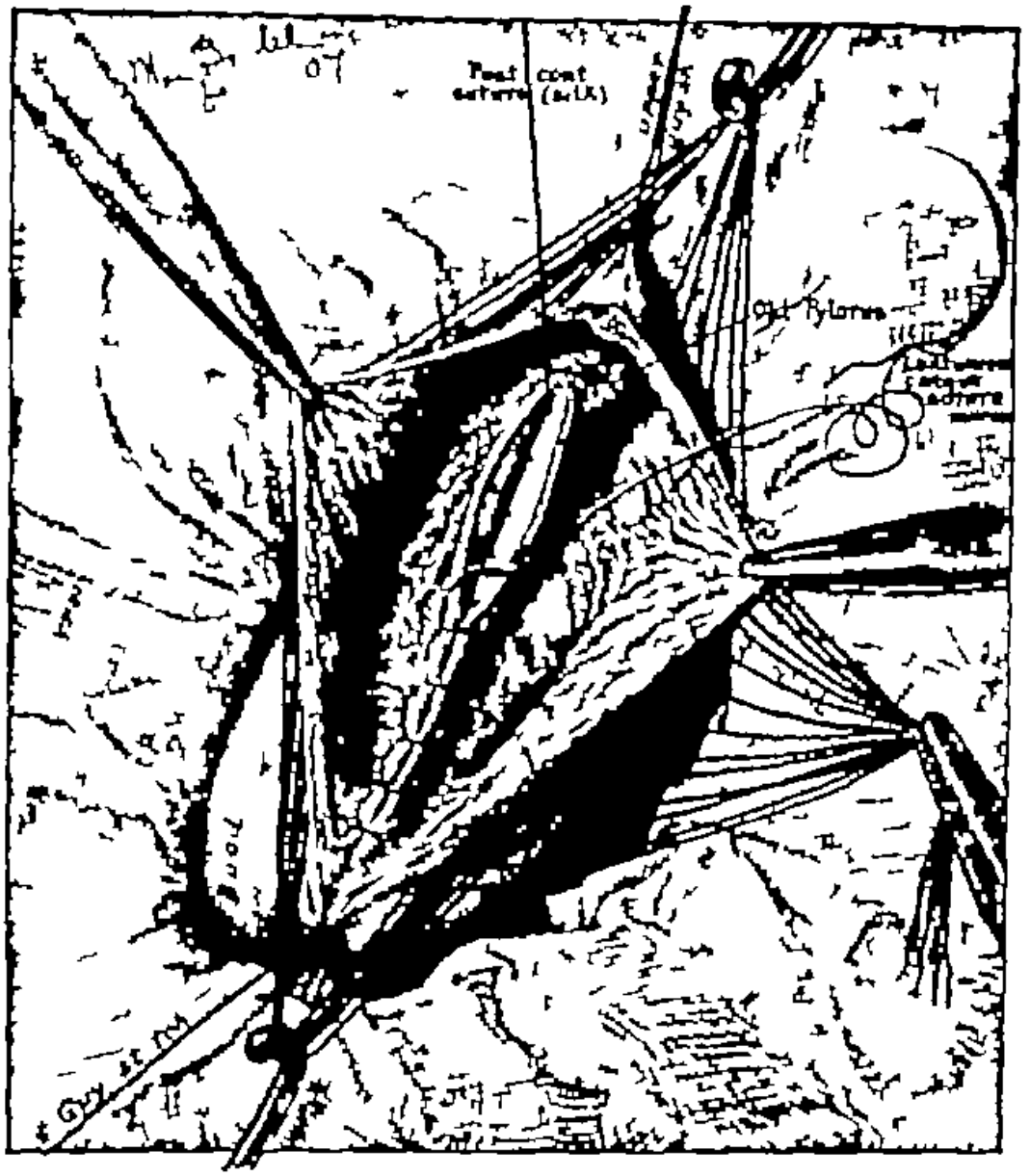


Plate 4 Anterior gastric and duodenal walls retracted, showing buttonhole suture of culprit partly placed in the free borders of the posterior walls Drawn by Kelly and Noble's Gynecology Vol II Kindly presented by W B Saunders Co

not occur immediately after operation but requires about two months before the normal is established, after which it continues to remain stationary Similarly the large quantity of contents obtained is gradually reduced to normal after operation, while the retention observed at first entirely vanishes It is, therefore, evident, that while the secretory and motor functions of the stomach are at once markedly improved after pyloroplasty these functions do not become normal immediately but several months must elapse before perfectly normal conditions are established

E V N Operation Ma 2, 904				
	Total Acidity	Free HCl	Quantity at (constant) After test Meal	On Fast ing Stomach
Before operation				
April 904		86	32	244 cc
After operation				
June 24, 1904	74	62	82 cc	
July 20, 904	48	42	58 cc	
Sept 3, 904	44	38	46 cc	
R M Operation Dec 6, 905				
Before operation				
Nov 905	76	65	305 cc	85 cc
After operation				
Jan 21 905	6	58	98 cc	
Feb 24, 1905	52	44	62 cc	
April 2, 905	48	36	50 cc	

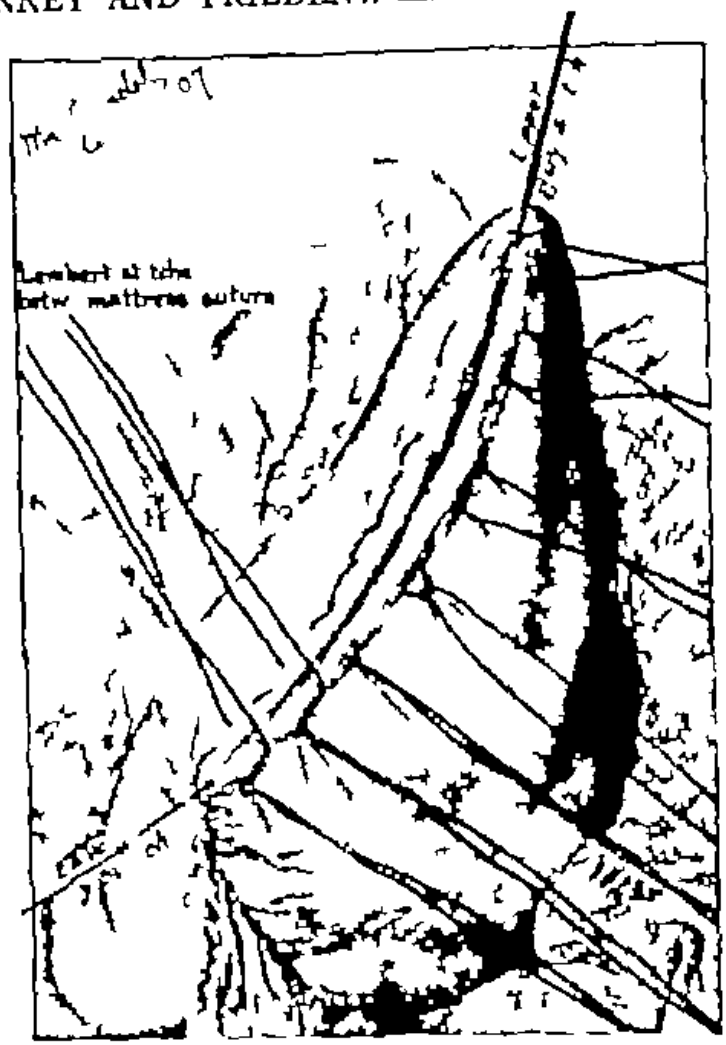


Plate 5 Mattress sutures previously placed now tied Alternate Lemberts placed between the mattress sutures Finney in Kelly and Noble's Gynecology Vol II Kindly presented by W B Saunders Co

C E R Operation May 2, 1907				
Before operation				
April 5 1907	96	8	30 cc	300 cc
After operation				
June 20 1907	92	76	85 cc	
July 5 1907	6	54	45 cc	
Sept 2, 1907	90	36	48 cc	
J B Operation March 9, 1907				
Before operation				
Mar 1907	00	59	435 cc.	400 cc
After operation				
April 5, 00	84	5	85 cc	
May 28 00	64	48	40	
July 2, 00	54	4	45 cc	

Deaths following operation There were five deaths following immediately upon operation these occurred from the fifth to the fifteenth day In one instance death was due to persistent vomiting due to an acute atrophy of the liver associated with the toxemia of pregnancy In a second and third to bronchopneumonia in very debilitated subjects, in a fourth to shock associated with diabetes and followed by coma, and in a fifth to chronic nephritis and uremia

IMMEDIATE RESULTS—DEATHS

The following table illustrates the number of deaths following immediately upon operation, with cause of death

Sex	Age	Day of Death After Operation	Cause of Death
F	36	5	Persistent vomiting associated with pregnancy
M	60	5	Atrophy of liver
M	50	6	Bronchopneumonia
M	58	5	Shock
M	59	5	Chronic nephritis (uremia)

The results of pyloroplasty during the first year of the operation are satisfactory on

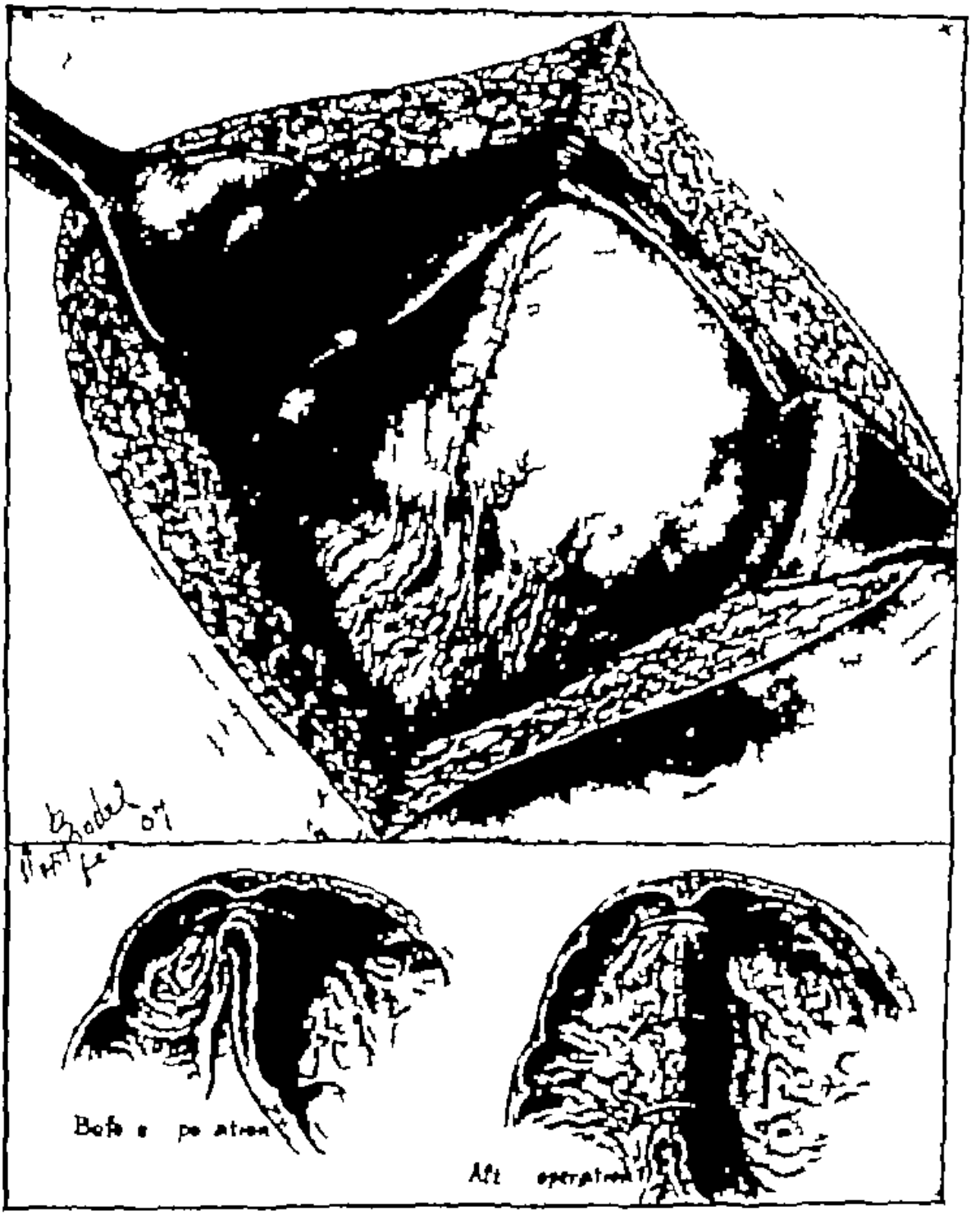


Plate 6 Operation completed Showing relative sizes of old and new pylorus Fenger in Kelly and Noble's Gynecology Vol II Kindly presented by W B Saunders Co

the whole. Of the 100 cases operated on, 5 had died immediately following operation and the results of 13 could not be obtained the results are therefore tabulated only in 82 cases, consisting of 54 males and 28 females the results were entirely satisfactory in 51 males and 26 females that is in 77 instances (93 9 per cent) and unsatisfactory in 3 males and 2 females that is in 5 instances (6 1 per cent)

TABLE ILLUSTRATING RESULTS OF OPERATION DURING FIRST YEAR

	Males		Females	
Age	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory
20–30	4		4	
30–40	4			
40–50	8		7	
50–60	14			
60–70			4	
	—	—	—	—
Total	5	3	26	

RESULTS AFTER FIRST YEAR OF REMAINING 78 CASES

Of the total of 100 cases the final results of 17 are unknown while 5 died soon after operation, leaving 78 cases. Of these the results were satisfactory in 50 males and 23 females that is 73 (93 6 per cent) and unsatisfactory in one male and 4 females, that is 5 (6 4 per cent)

RESULTS AFTER FIRST YEAR OF REMAINING 78 CASES

	Males		Females	
Age	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory
20–30	4		3	
30–40	4			
40–50	8		6	
50–60	3			
60–70			4	
	—	—	—	—
Total	50		3	4

In the following table are noted the number of cases that have been observed from one to twelve years after operation, together with the final results. The average of the satisfactory recoveries is shown to be 93 4 per cent If we deduct from this number 5 per cent, that is those cases already referred to in which death occurred immediately upon operation, the percentage of favorable results is reduced to 88 8 per cent.

As an additional factor in determining the satisfactory results in addition to freedom from digestive disturbances, gain in weight and general well-being we have had a series of X ray plates made in five cases, all of which had been operated on over one year and the stomach was found to be functionating perfectly normally in all, emptying itself at a normal rate. As a whole the final results of pyloroplasty have, therefore proven satisfactory

END RESULTS IN YEARS AFTER OPERATION OF PYLOROPLASTY

Years	Total Number of Cases	Satisfactory Results	Unsatisfactory Results	Percentage of Satisfactory Recoveries
	4	4		100
	5	5		00
3				9 6
4	7	7		100
5	5	5		100
6	8	8		100
7	6	6		100
8		8		80
9	8	8		100
	5	4		80
	4	4		100
	4	3	1	75
Average of percentage of satisfactory recoveries				93 8
Deaths				5
Favorable results				88 8

From our observations of a study of 100 cases of pyloroplasty we believe we are justified in drawing the following conclusions

1 The operation has its greatest indication in the relief of pyloric stenosis due to chronic ulcers, situated at or near the pylorus and on either side of it, or resulting from cicatricial contraction following the healing of such ulcers. It is often a useful procedure in cases of hemorrhage due to gastric ulcers on the lesser curvature or to duodenal ulcers which cannot be controlled medically and which threaten the life of the patient, as well as in the chronic dyspepsias due to ulcers which have not been relieved by medical treatment.

2 The operation has certain advantages over gastro-enterostomy and but few of its disadvantages.

3 Such objections as are urged against the operation e g its inapplicability in the presence of adhesions surrounding the pylorus, as well as in the presence of active and bleed

ing ulcers and also because of the fact that the new opening is not at its lowest point, taking advantage of gravity are according to our experience more fanciful than real since the operation has frequently been performed under these conditions with most gratifying results. The interesting experimental work of Cannon and Blake and others supports this contention

4. The only contra indications to the operation are inability to mobilize the duodenum when adhesions are too dense and thickening and infiltration about the pylorus due to hypertrophic forms of ulceration These conditions, however in our experience occur but rarely

5. In atony or gastroptosis with slight motor insufficiency such as is observed in the water-trap stomach or in nervous dyspepsia in gastric disturbances not dependent upon organic disease this operation is contra-indicated

6 The special advantages of this operative procedure lie in its affording the opportunity to excise all ulcers in the anterior walls of the stomach or duodenum after direct inspection of the part affected also the application of treatment to ulcers situated in the posterior walls It does not greatly disturb the normal relation between the stomach and intestines as is the case in other operations.

7 From our experience with the operation, the immediate as well as the final results are most encouraging While in some instances partial gastrectomy or gastro-enterostomy is undoubtedly the operation of choice nevertheless, on account of its simplicity and because of its satisfactory end results, we believe that pyloroplasty will continue to retain it position as a safe and useful procedure

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CLINICAL SUGGESTIONS BASED UPON A STUDY OF PRIMARY SECONDARY (CARCINOMA?) AND TERTIARY OR MIGRATORY (CARCINOMA) EPITHELIAL HYPERPLASIA IN THE BREAST

BY WM CARPENTER MacCARTY M D ROCHESTER MINNESOTA
Mayo Clinic

THE writer's reasons for making the following contribution to the pathology and therapeutics of the breast may be briefly stated.

An examination of the literature reveals that there are at least 147 different terms which are utilized to express pathological mammary conditions These are confusing to the great majority of practitioners, surgeons, teachers, and students Many of these terms are synonyms an example of which may be seen in the fact that there are twelve synonyms for the condition which Billroth and Koenig described as "mastitis cystica chronica"

The classifications which have been and are utilized are numerous and very different This may be seen also in the fact that the best authorities disagree upon the character of such conditions as cystadenoma, abnormal involution, and senile parenchymatous hypertrophy These may be found described by some writers as benign conditions and by others as malignant conditions

The clinical uncertainty which exists as a result of the confusion of terminology the multiplicity of classifications, the divergence of operative advice from the general pathologist, and the lack of recognition of carcinoma as a part of an epithelial hyperplasia, have occasionally led to radical amputations of breasts unnecessarily and also have allowed tumors which were clinically benign to remain in the presence of a possibility of malignancy

The fact that general pathologists have recognized only epithelial hyperplasia into the stroma as carcinoma has led to advice to

Read before the Southern Surgical and Gynecological Association Atlanta December 16 to 18 1914

the surgeon which has often proved to be disastrous

The dogmatism relative to the rôle which the very indefinite basement membrane has played in being the histological arbitrary line of demarcation between benign conditions and malignant conditions, has often retarded surgical radicalism which is with our present knowledge absolutely necessary in the treatment of cancer

These existing conditions have stimulated a series of investigations of the pathology of one thousand breasts It has been thereby shown that there are three definite histologic pictures which form a logical basis upon which operative procedure may be carried out

The mammary acinus (gland unit) (Figs 1 2 and 3) is composed of one row of columnar or cuboidal epithelial cells, which are the functionating or secretory cells

These rest upon another layer of cells which are almost invisible in the normal breast but which become prominent when there is a chronic inflammatory reactive process present (Fig 3) These correspond to the so-called stratum germinativum of the skin and are the cells which are the progenitors of the differentiated or secretory cells They constitute the germinal cell of the epithelium of the breast In the presence of chronic inflammatory reaction in the mammary one or more of three histologic pictures (Figs 2 3 4 5 and 6) are seen whether the condition be encapsulated or non-encapsulated

When the differentiated cells (inner row) and the undifferentiated cells (outer row) are present the histologic picture may be spoken of as *primary epithelial hyperplasia* (Fig 2a and 3) When the differentiated cells are absent and there remain only the hyperplastic undifferentiated cells of the outer row the condition may be referred to as *secondary epithelial hyperplasia* (Figs 2b and 4) When the line of demarcation between the hyperplastic undifferentiated cells and the stroma is indefinite or absent and the epithelial cells appear in the periacinar stroma the condition may be spoken of as *tertiary or migratory epithelial hyperplasia* (Figs 2c, 5 and 6)

Primary epithelial hyperplasia represents the usual reaction in chronic mastitis and is not considered to be malignant.

Tertiary hyperplasia or migratory hyperplasia is the histologic picture of carcinoma

Secondary hyperplasia is found described as cystadenoma Schimmelbusch's disease Reclus disease "senile parenchymatous hypertrophy abnormal involution etc. It may or may not be malignant it is placed in a benign group by some authorities and in a malignant group by others.

The cells of the epithelium in this condition are often indistinguishable from the cells in tertiary hyperplasia a characteristic which arouses a suspicion that the two conditions are intimately related if not a part of the same thing namely a malignant hyperplasia.

Without proof relative to the outcome in such a condition one may state that secondary epithelial hyperplasia is a doubtful condition a group which needs special attention during the next decade.

The practical application of a knowledge of the three apparent histologic stages of hyperplasia may readily be seen in the fact that the life history of the most common pathologic conditions in the breast depends upon epithelial hyperplasia.

Mammary pathological conditions divide themselves into two groups i e an encapsulated group (Fig 7) and a non-encapsulated group (Fig 8)

The encapsulated conditions to which special attention has been given during this investigation are the fibro-epithelial neoplasmata such as simple adenomata, adenofibromata fibro-adenomata and cysts in all of which epithelial hyperplasia occasionally occurs in all three stages.

Of the non-encapsulated conditions the most common is chronic mastitis in which primary secondary and tertiary hyperplasia are also frequently found in the same field of the microscope

With the possibility of these conditions being present in cases in which the classic clinical signs of carcinoma are absent the surgeon and the surgical pathologist must agree upon a scientific histological standard before any definite operative procedure will bring about scientific knowledge of prognosis

THE MAMMARY GLAND

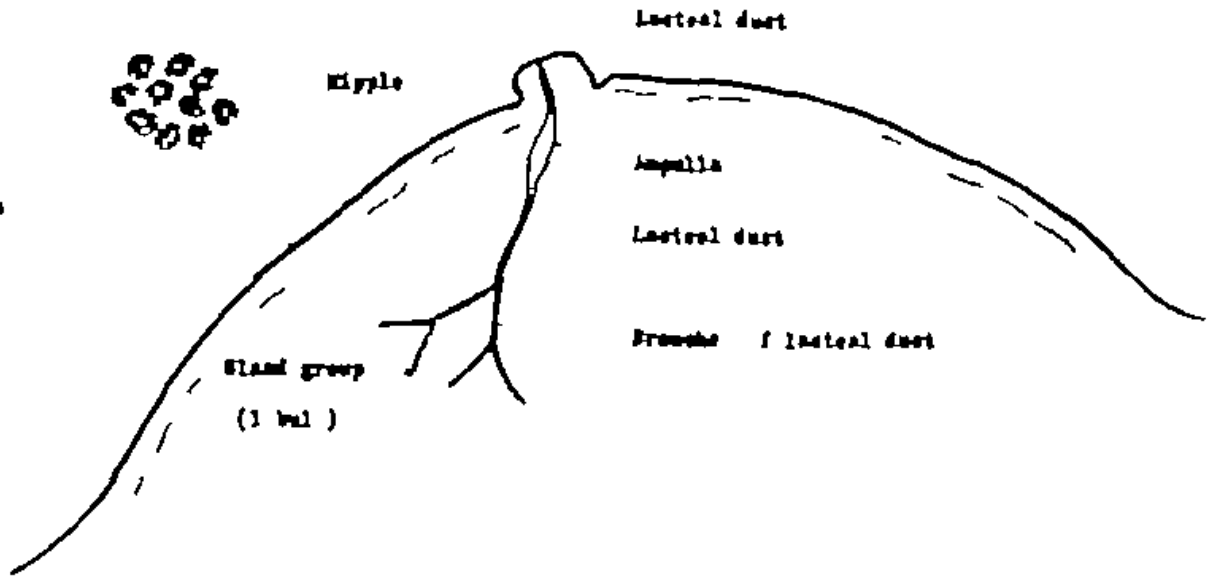


Fig Diagram of the mammary gland



Primary pithelial hyperplasi (not carcinoma)



Secondary pithelial hyperplasi (carcinoma ?)



Tertiary migratory hyperplasi (carcinoma)

Fig Diagram of the mammary acinus in, a, primary b secondary (carcinoma?) and c, tertiary or migratory (carcinoma) epithelial hyperplasia



Fig 3 Primary epithelial hyperplasia



Fig 4 Secondary epithelial hyperplasia (carcinoma?)

At present, surgeons have no very definite method or standard of dealing with the doubtful group Radical operations are sometimes done when they are not needed, simply because the surgeon gives the patient the benefit of the doubt. The writer has occasionally seen carcinomata excised for benign tumors.

It seems that there should be a mean between the two extreme conditions, and this mean should with the aid of a knowledge of the stages of epithelial hyperplasia, serve to scientifically solve the following problems

1 The percentage of cases of tertiary hyperplasia with or without glandular involvement which may be cured after an arbitrary period of ten years from the time of radical operation.

2 The percentage of cases of secondary hyperplasia which will remain well or recur after the removal of the mammary gland itself without the removal of the glands, muscles and large amounts of skin.

3 The percentage of cases with local chronic mastitides or encapsulated conditions which return later with secondary or tertiary hyperplasia after local removal.

The question for the surgeon to decide is whether or not he is willing to run the chance of local recurrence after wide local removal of a malignant condition followed by an exten



Fig 5 Tertiary epithelial hyperplasia (carcinoma)



Fig 6. Tertiary epithelial hyperplasia (carcinoma)

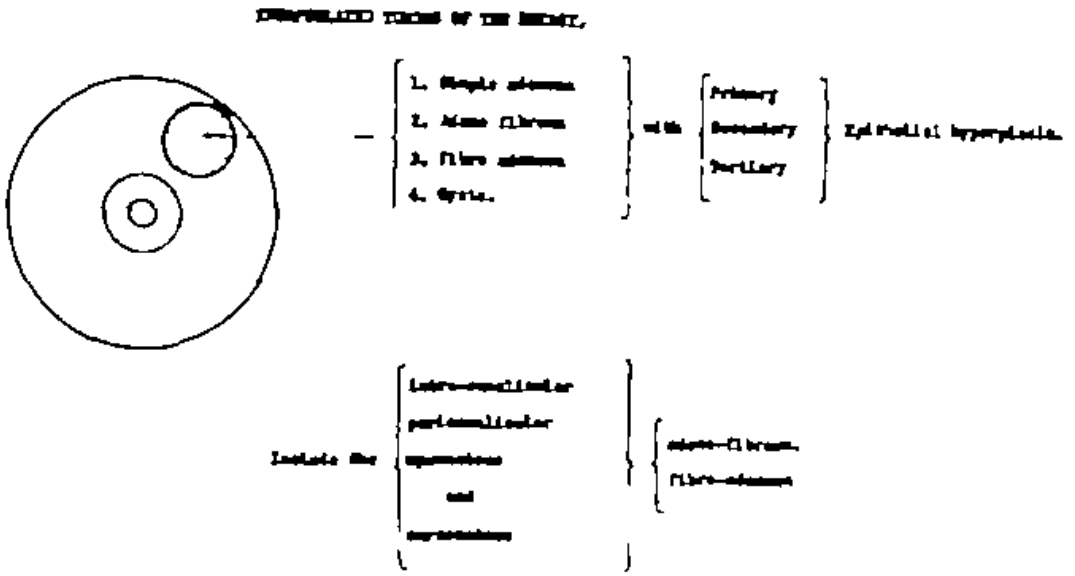


Fig 7 Diagram of encapsulated mammary conditions

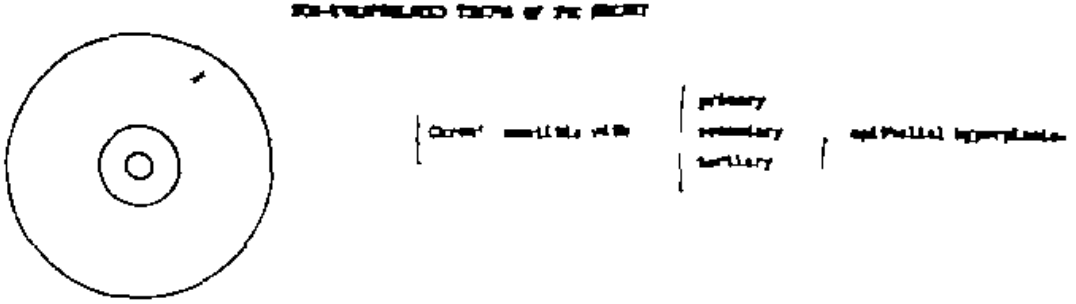


Fig 8. Diagram of non-encapsulated mammary conditions

sive operation after microscopic examination or take the credit of doing radical operations unnecessarily in an attempt toward conservatism. This, with our present knowledge, can only be answered by conscience, and not by scientific data.

The plan which suggests itself to the writer after an extensive experience with the pathologic conditions to be dealt with and also an intimate association with the activities of surgeons, seems to be based upon some known factors relative to the histology of epithelial activities and the fact that surgeons differ regarding the extent of operations necessary in the conditions which have been described above

1 The conditions which are associated with classical clinical signs of carcinoma should be treated radically

2 The doubtful cases in women near or over 35 years of age should have the entire mammary gland removed for immediate examination If primary or secondary hyperplasia be present, nothing more should be done if tertiary hyperplasia be present, a radical operation should be performed.

3 In doubtful patients near or under 35 years of age, a wide section of the mammary gland including the pathological conditions should be removed for examination If primary hyperplasia be present, nothing more should be done If secondary hyperplasia be present, the rest of the mammary gland should be removed and if tertiary hyperplasia be present, the radical operation should be accomplished

This plan avoids incision of tumors. It removes the possibility of unnecessary radical operations and their physical and psychical embarrassment It provides for a scientific means of determining more accurately the stage at which cancer may be cured by surgical operations and the extent of the operation which is necessary to effect such a cure.

In the experience of this clinic the removal of the mammary gland preceding an immedi-

ate radical operation has not been associated with earlier recurrence that has been found after a primary radical operation.

The plan is herewith presented with the realization that it is a conservative experiment which is based on scientific facts. It is based upon actual research upon each specimen and is free from the incumbrances of extensive terminology and dogmatism relative to which specimen is and which is not carcinoma.

It presents a means of actually determining what is clinically malignant.

It makes the surgeon an essential factor in the study of the biology of the epithelial cells and their relation to cancer It will save many patients from unnecessary mutilation and will give radicalism its proper place in the treatment of cancer of the breast.

END RESULTS IN OPERATIONS FOR CANCER OF THE BREAST[1]

By E. S JUDD M D Assisted by W E SISTRUNK, M D Rochester, Minnesota

THE following is a review of the results of operations in our clinic for cancer of the breast from January 1 1902 to January 1 1912 It was originally intended to report all the cases of mammary cancer that had been operated on more than three years earlier but in spite of the fact that we have endeavored for several years, through correspondence and personal communication, to complete our post-operative records, so far accurate data in many of the earlier cases have not been obtained. It seems best, therefore, to make this report cover the results of the ten consecutive years up to two years ago of which we have fairly correct knowledge, hoping to be able to complete the data on the earlier cases at some future time.

Previously it was customary to allow three years to elapse before making claims of a cure following an operation for cancer It is undoubtedly true that many patients who pass through the first three years without recurrences do remain well, but it is also true that a certain percentage of them have recurrences and metastases at a period much later than three years In view of this, it is difficult to say how much time should elapse before a patient operated on for mammary cancer may be said to be cured.

It is impossible to state what course these cases would have taken had they not been operated on but, judging from the histories of similar though non-operated cases, it is fair to assume that a goodly proportion of those operated on reasonably early have either been cured or at least have had an extension of life and a comfortable existence for many years. Cases not operated on prove fatal, on an average in 20 to 28 months the extremes varying from less than two months to more than 20 years Finney

The cases upon which our study is based are consecutive cases, and none have been omitted from which post-operative data were obtained Many operations were known at the time to be palliative, and were performed because of ulceration or the patient's extreme suffering Many times these palliative operations were satisfactory bringing relief and apparently prolonging life.

The principle in the technique of all the radical operations was practically the same, and consisted in the removal of the entire breast, axillary glands and fascia, including the pectoralis major and minor muscles in every case. These structures were usually all removed in one piece. In the evolution of the operation, the tendency in the later years has been to remove more widely the subcutaneous and deep fascia in all directions In some cases it has been necessary to skin-graft the wound in order to close it, though in most of our cases we have been able to suture the skin flaps directly In many of the cases we employed technique as suggested by Jackson

[1] These operations were performed by C H Mayo, E H Buckner, E S Judd, and D C Balfour

Read before the Southern Surgical and Gynecological Association, Atlanta, Georgia, December 16 to 18, 1912.

and also by Rodman, and have found their methods very useful.

It has not been our practice to remove the fascia and glands from above the clavicle. If these glands are palpable, one is removed for microscopic examination, to determine the nature of the enlargement. If the supraclavicular glands prove to be involved, it has usually been our experience that the individual lives longer and more comfortably if not operated on. In some cases, however especially when the lesion in the breast is in one of the upper quadrants and especially if there be attachment to the skin, we believe that it is advisable to continue the dissection of the fascia and glands to the supraclavicular region. In most cases in which the glands were involved the individual has not lived three years. In one of such cases, however the glands showed definite cancer and the patient is now living (more than five years) without recurrence.

The diagnoses in all these cases were made from both macroscopic and microscopic evidence. During the ten years from January 1 1902 to January 1 1912 we have operated on 609 patients with cancer of the breast of these 607 were females and two were males. One of the males is alive without recurrence three years following the operation. The other male died at the end of two years and eight months from recurrence.

Of the 609 cases we have been able to trace and have fairly accurate knowledge of 514. No patients in this series died in the hospital, though three died within one month after the operation. Patient No. A7541 died at the end of two weeks when the wound was well healed the autopsy in this case showed a large pulmonary embolism as the cause of death. Patient No. A46874 died at the end of the fourth week, in diabetic coma. The wound had healed and the autopsy showed no carcinoma. Patient No. A22134. Wound did not heal patient developed septic phlebitis dying at the end of fourth week from sepsis.

In estimating the age incidence of carcinoma of the breast, we found that the youngest patient was 25 and the oldest 85 years of age. Estimating the number of cases occurring in each decade we find

TABLE I

20 to 30 years of age	13 patients
30 to 40 years of age	47 patients
40 to 50 years of age	28 patients
50 to 60 years of age	47 patients
60 to 70 years of age	85 patients
70 to 80 years of age	7 patients
80 to 90 years of age	1 patient

In one patient 26 years of age, a tumor in the lower inner quadrant of the right breast was supposed to be benign but at the time of removal it proved to be cancer. The wound was packed with gauze saturated with Harrington's solution, and two days later a radical operation was performed. This patient is alive and without recurrence seven years and nine months after the operation.

One patient, 25 years of age, whose tumor was diagnosed as malignant intracystic papilloma, at the time of the operation was nursing a 9-month-old baby. She is alive without recurrence more than six years later.

One patient, 28 years of age, with carcinoma of the left breast and concerning whom the prognosis at the time of operation was considered good except for her age, is well now after three years and three months.

One patient 26 years of age, diagnosed as early cancer of left breast, is alive with questionable local recurrence two years and nine months after operation.

One patient 28 years of age, with cancer of the right breast and axillary glands, recurring after a partial removal of the breast elsewhere one year before, is alive without recurrence two years and nine months after operation.

These cases are mentioned especially to show that mammary cancer in a young person is not necessarily hopeless, and that a good percentage of the cases coming for treatment early may be relieved for a long time, and that even in recurring cases a fair result may sometimes be obtained.

As will be seen from the table, many of our cases have occurred in the so-called cancer age — 40 to 50 years — and by far the greatest proportion between 30 and 60 years. Nearly all the younger patients who remained well have been those who came for treatment early before there was any evidence of extension to the lymphatics.

TABLE II

Percentage of deaths according to age

	Age	Based on number of patients traced from				
		Died less than 1 yr	Died less than 2 yrs	Died less than 3 yrs	Died after 3 yrs	Alive 10 to 11 yrs
Total preclimacteric periods	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total climacteric periods	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total postclimacteric periods	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

In Table II may be seen the percentage of cases for each decade who have died within the first year after operation. We cannot explain why the younger patients have apparently done better than the older ones except that the great majority of them came for treatment early

TABLE III

Results of patients operated over period of three years

510 patients operated on more than three years
427 patients have been traced
34 patients have died
9 patients are living
44 7 per cent of patients have lived more than *three years.*
2 of these patients have recurrence at the present time
9 patients died from other causes

Of the 514 patients whom we have been able to trace 266 or 51 7 per cent are known to be dead Twenty-one of these died from other causes without clinical signs of recurrence On several of these patients autopsies were performed and no recurrence was found Subtracting these from the number who have died from cancer leaves 47 6 per cent of deaths from cancer for the entire series Of the 514 patients 248 are known to be alive from two years to eleven years and four months. Thirty seven of those living are known to have recurrences

In 1902 24 patients were operated on Of those operated upon more than 11 years, we have traced 19 15 have died from various causes and 4 are alive and have no recurrences Thus 21 per cent of this series are now alive after more than eleven years and without recurrence. In each of these patients the carcinoma was in the left breast. The axillary glands were enlarged in two of them One of this series who died had had a fairly radical operation elsewhere twelve years before She came to us with recurrence in the skin and axilla. This was removed and she lived two years and two months following this operation One of these early patients lived six years and nine months after the operation, and died of arteriosclerosis, without evidence of recurrence. One other lived six years without local recurrence, and died of metastases in the liver

Twenty-six patients were operated on in 1903 Of this group we have been able to trace 21 and 43 per cent are alive without recurrence All of these patients have lived more than ten years. Two in this series had been operated on for malignant disease in other organs. One patient had had a hysterectomy for carcinoma of the uterus two years before and one other had been operated on three months before for malignant papillary ovarian cysts

Patients living more than ten years Of the patients operated on during the years 1902 and 1903 we have been able to trace 40 of these 27 are known to be dead from various causes, which leaves a percentage of 32 5 per cent alive without recurrence more than ten years Three of the patients who died lived more than six years and died from other causes

Patients living more than five years Of the 321 patients operated on more than five years 266 have been traced. Of these 148 are known to be dead and 106 are living thus giving a per centage of 39.8 living more than five years Six of these patients have recurrence at the present time Fourteen included in these deaths have died from other causes.

Patients living more than three years Of the 510 patients who have been operated on more than three years 427 have been traced 234 are dead and 191 are living, leaving a percentage of 44 7 of patients living more than three years Of these, 27 have recurrences at the present time 19 are known to have died from other causes

Late recurrences We have also in this series several who have died from carcinoma

after being free from it for a number of years. In one instance the patient died nine years and one month after the operation from general carcinosis. One had metastases in the lungs five years and eleven months after operation. One had internal metastases in the liver six years and four months another had metastases without any local recurrence, and died six years and five months after operation. In one instance we operated for recurrence twelve years after the primary operation the patient remaining well nearly three years after the secondary operation.

We have known for some time that late recurrences occur following operations for carcinoma of the breast but we have been rather surprised to find so many patients with late recurrence. In reviewing the literature on this subject we have found one case reported by Matas with recurrence nearly 25 years after the first operation and another reported by Ransohoff in which there was recurrence nearly 20 years after the primary operation.

Our statistics do not bear out the supposition that excision of the tumor or a part of the breast, followed by a radical operation within a few days or weeks, means always a bad prognosis. For example in one of our cases the breast was removed for supposed mastitis. This was found on examination in the laboratory to be carcinoma. It is our custom in such cases to arrange for an immediate radical operation in all instances if it is found to be necessary. In this particular instance however the radical operation was not performed until seventeen days after the incomplete operation. This patient is now living without signs of recurrence seven years and nine months after the operation. In another case a specimen had been removed one week before the patient came to our clinic, and at operation definite carcinoma of the breast was demonstrated. This patient at the present time is alive and free from recurrence, six years and two months after the operation. In one other case which is still more striking, the patient's breast was removed elsewhere four years before. Some weeks after this operation she developed nodules in the axilla. These were treated by X ray over a period of some months. We removed the recurrent masses and she has been living now six and a half years without further evidence of cancer.

On the other hand we have had five cases in this series in which specimens had been removed elsewhere from three weeks to one year before our radical operation and all these patients died, from two months to two and one half years later.

We have had several patients in whom both breasts were involved. If both were involved at the same time the prognosis as a rule was bad. If one had been removed and there was recurrence later in the other breast the prognosis was often quite favorable. In 1905 we operated on a patient whose opposite breast had been removed in 1899. She lived four years eight months after the second operation.

In 1906 we operated on two patients in whom there was a very small lesion in the breast, and no glandular involvement could be found. Macroscopically and microscopically the diagnosis was early carcinoma, and we believed both were favorable cases. Both of these patients had early metastases and one died within two years. These two patients seem to illustrate a certain group who in all probability at the time of operation have internal metastases or extension to the mediastinal glands without evidences of such extension. We have seen several hopeless cases because of metastases to the liver spine or bones, and yet in which the primary focus was small and free and no enlarged glands could be felt.

We have also observed two such patients with pathological fractures of the femur. In both of these the fractures occurred five years after the operation. Metastasis to the bones has not been common, though many of the replies to our inquiries would indicate involvement of the vertebræ. Involvement of bone is usually late.

We have considered œdema in the breast as a contra indication to operating, because we believed that the lymphatics were all blocked by the extension of the cancer. One of these patients in whom the prognosis was bad because of œdema and who was operated on as a palliative measure, is yet alive without recurrence five years and three months later.

Cancer in the lactating breast has been most unfavorable. Of the three patients operated on, two have died within the first year in the one exception the growth was an intra-cystic papilloma.

TABLE IV

Results in patients operated on over periods of five years

321 patients operated on more than five years
266 patients have been traced
148 patients have died.
96 patients are living
39 8 per cent of patients have lived more than five years
6 of these patients have recurrence at present time.
14 of these patients died from other causes.

TABLE V

Results in patients operated on over periods of ten years

50 patients operated on more than ten years.
40 patients have been traced
37 patients have died
13 patients are living.
3 5 per cent of patients have lived more than ten years
None of these patients have recurrence at the present time
3 patients died from ther causes
All of these three patients lived more than six years

TABLE VI

Number of cases and percentages for each year

Year	No. of Cases	Traced	Dead	Alive, no Recurrence	Alive, with Recurrence	Alive, no Recurrence	Alive, with Recurrence
[illegible]	[illegible]	[illegible]				[illegible]	
[illegible]	[illegible]	[illegible]	14	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]

Functional result. Special inquiry has been made regarding the ability to use the arm and shoulder following these operations, and a very large percentage of the patients have reported that their arms are all right or practically as good as ever We have noticed that when it is necessary to destroy one of the motor nerves the function is much more apt to be impaired. Pain in the arm is usually complained of shortly after operation, but in most of our cases this entirely disappears within two weeks. We have made special inquiry regarding oedema in the arm. Occasionally the swelling and oedema has been marked Counting the patients with the oedema and those who say they have some swelling of the arm at times, the entire group is not over 5 per cent. The oedema, as we have seen it occurs in two ways first, as primary oedema immediately following the operation This is quite common, and we believe it is due to a thorough removal of the lymphatics It persists until collateral circulation in the lymphatics has been established. This is usually a matter of two or three weeks, and can be relieved by early exercise and massage. Second, are those patients in whom the oedema comes on late, several months or years after the operation. Here it is due to a recurrence of the carcinoma in the remaining lymphatics, which have been draining the arm, and of course is permanent. In four patients we have removed the entire axillary vein down to the cephalic vein taking care that the latter was not injured The resulting oedema was but slight and temporary Even with the removal of the pectoral muscles, intercostals, part of the latissimus dorsi and serratus magnus, and all of the axillary fascia and lymphatics, in many of these cases the function of the arm and shoulder has been impaired very little.

CONCLUSIONS

1 Results in operations for cancer of the breast are as good as if not better than results in operations for cancer elsewhere.

2 The prognosis in younger people who received the benefit of an early operation was better than we had expected.

3. The prognosis is variable in a certain per cent. An extensive external involvement may give a fair prognosis, while a slight external lesion may terminate early from internal metastasis.

4. That metastasis may occur many years after the operation, though in the great majority of instances it will appear in the first few years, if at all The difference

between the percentage of patients living more than three to five and ten years is not as great as might be expected but this is because most patients who die of the disease die within the first three, or at least the first five years. Living five years without recurrence is an indication of but slight trouble in the future

5 Comparing these results with those of former years, we feel that the results are improving and that the improvement seems due to the fact that patients are coming earlier rather than to any improvement or change in the technique.

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GASTRIC HÆMORRHAGE

By JOHN B DEAVER, M D Philadelphia

GASTRIC hemorrhage or the copious effusion of blood into the stomach is as a rule followed by hæmatemesis, and results from a number of disturbing factors in the mechanism of the upper abdominal circulation. In the minority of cases the blood is not at once ejected but is passed subsequently by the bowel in the form of tarry stools Cases of gastric hæmorrhage fall into two groups, the surgical and the non-surgical or medical It is as great a mistake to operate on non surgical cases as it is to withhold operation in surgical bleeding The exploratory operation, therefore is not available for diagnosis, and successful treatment demands a high degree of diagnostic skill in deciding for or against operation.

It is well to bear in mind that blood which is vomited does not always mean gastric hæmorrhage The older clinicians called forcible attention to hæmatemesis as a symptom of hæmorrhage from the pharynx or respiratory tract, the blood being swallowed and later vomited I have seen profuse hæmatemesis in hæmorrhagic inflammation of the biliary tract the blood having reached the duodenum through the common duct and then regurgitated into the stomach The primary cause in this case was acute streptococcic cholecystitis. One case of carcinoma of the jejunum was characterized by profuse hæmatemesis. Profuse hæmorrhage from a duodenal ulcer not infrequently is carried backward into the stomach, and after a gastro-enterostomy a marginal or jejunal ulcer may bleed into the stomach. The examination of all the rare causes of hæmatemesis would serve here no useful purpose. Most often true gastric hæmorrhage is due to ulceration of the stomach. The ulceration may be due to malignant disease or to a benign process It may be acute or chronic, superficial or deep large and extensive or microscopically small.

Profuse and even fatal hæmatemesis without demonstrable ulceration of the stomach has been observed in a considerable number of cases both at autopsy and at operation. Dieulafoy has described a variety of hæmorrhage due to the formation of minute mucous erosions single or multiple Such erosions have been observed as linear or stellate fissures in the act of bleeding during operation. Paterson reports a case in which no visible erosions were present, but a raised vividly red patch of mucosa the size of a half-crown was seen to be oozing blood. I have observed a case by gastrotomy in which the whole mucosa was intensely red and thick and bled at the slightest touch. Such a condition I am inclined to consider as a hæmorrhagic gastritis, and it is probable that it is the result of an intense acute infection of the mucosa, though it may be due solely to an unknown toxic cause. Of 459 of our

Read before the Clinical Congress of Surgeons of North America Chicago November 1913.

cases of upper abdominal disease hæmatemesis occurred in only 25 per cent, and 10 per cent of these cases were either simple ulcer or cancer of the stomach.

Vicarious menstruation as a cause of hæmatemesis is an absurdity of the medical imagination, more fertile in hypothesis than wise in the knowledge of living pathology

A knowledge of the hæmorrhagic possibilities of active congestion of the gastric mucosa cannot be learned at the mortuary slab but only by witnessing its bleeding surface in the living

The touch of the surgeon during life as Mayo has so well said, has revealed that which post mortem pathology has overlooked Profound knowledge of the pathological anatomy of the conditions giving rise to gastric hæmorrhage is only gained by autopsy *in vivo* which knowledge is as essential to the making of a diagnostician as it is to go into the water to learn to swim Internists will never be alive to the possibility of ulcerative pathology until they have been made familiar with an eye demonstration in the living subject

Excepting extrinsic poisons, I believe this violent congestion of the gastric vessels is primarily dependent upon an intra-abdominal or more rarely a remote focus of infection. I believe, further that the atrium of infection in these cases is most commonly the appendix the gall-bladder the fallopian tube, and more rarely some other storehouse of bacterial growth This variety of acute massive hæmorrhage from the gastric mucosa without evident ulcer occur most often in young females. Exceptionally it has been noted in males and at the older ages. It is distinguished chiefly by the age and sex incidence by the suddenness of onset and freedom of the hæmorrhage by the usual absence of previous ulcer symptoms and by spontaneous recovery in the majority of instances Mansell Moullin, in 1907 stated that he had observed 153 cases of hæmatemesis due to supposed gastric ulcer occurring in females under 30 years of age with only one death He believed his experience was exceptional in respect to mortality but Bramwell, in almost as large a series of cases belonging chiefly to this group experienced a mortality under medical treatment of only 3 per cent. Hale White has reported 29 cases of hæmatemesis in which post mortem examination revealed no gastric lesions, and suggested for the condition the name gastrostaxis. Dawson contributed two cases, and preferred the term hæmorrhagic gastralgia. While I have never operated upon this condition during acute bleeding it has fallen to my lot to explore the stomach in a number of cases in which a history of hæmatemesis and some sort of indigestion had indicated the probability of ulcer without being able to demonstrate any lesion, past or present. Even allowing for the well-known difficulty of demonstrating erosions or fissures by operation or autopsy I believe it is clear that there is a hæmorrhagic disease of the stomach which is not any form of gross ulcer and probably is not closely related to it. Bramwell gives a suggestive case of hæmatemesis in which the underlying condition of vegetative endocarditis gave little indication of its presence during life It appears to be clear also that the toxic or infective influences which cause this variety of hæmatemesis are not materially improved by operation upon the stomach. In ten cases of acute hæmorrhage in which no lesion was demonstrated at operation there was one operative death and two cases of recurrence of bleeding We must therefore yield to the results of experience and eliminate this group from operative endeavor

The condition of mucous erosions described by Dieulafoy has been established as a true pathological condition by the actual observation of such erosions in the form of linear or stellate fissures in the act of bleeding during operation Whether this condition stands most closely in relation to hæmorrhagic gastritis or to acute peptic ulcer it is not yet possible to determine Clinical evidence does not suffice and living pathology has not yet dispelled the mystery Such erosions may bleed furiously even to the point of exsanguination and death. In the past ten years I have found in the literature six such patients treated by gastrotomy and ligature of bleeding points of the mucosa. In one case a gastrojejunostomy was added There

were no deaths but the number of cases is small, and it is hard to resist a feeling that in view of the diffuse nature of the disease the recoveries that followed such simple measures cannot justly be given too large a measure of credit. It is highly probable, moreover that at least a percentage of cases regarded as gastrostaxis belong in this group. I have operated upon six cases in this group without mortality The operations were gastrotomy for exploration, gastrojejunostomy and plication of the duodenum for relief. *The immediate results were excellent*, but I have not been able to follow all of the cases. My belief in the necessity of the operation in this class of cases has been considerably undermined by the good results of medical treatment. I do not believe that gastrojejunostomy should be performed in the absence of gross gastric lesions.

Hemorrhage more or less acute may result from the formation of the typical acute peptic ulcer the vessels beneath the muscularis mucosa being opened by the ulcerating process. Such hemorrhage is rarely fatal, the vessels opened being small and their walls still soft and normal, permitting retraction and contraction with the formation of an occluding clot as the blood pressure is reduced by hemorrhage. In many cases acute ulcer announces its presence by bleeding and if appropriate measures are taken the hemorrhage is rarely dangerous and seldom repeated

In chronic ulcer as pointed out by Fenwick, the vessels eroded may be larger and as a result of the sclerosing inflammatory process which has preceded the actual erosion the vessel wall is rigid and incapable of contraction Hemorrhage from this source, therefore, is apt to be free and if stopped temporarily by the fall of blood pressure and clot formation, it is prone to recur from digestion of the clot and advancing erosion.

While it is true that sudden massive hemorrhage does occur in chronic gastric and duodenal ulcer it is also true that it is not a characteristic of ulcer to bleed profusely Occult blood or small recurring hemorrhages are far more characteristic of ulcer and it is therefore incumbent upon the diagnostician, in the presence of diffuse hematemesis to adduce considerable evidence in the way of history or examination before concluding that ulcer is present.

Sudden profuse hemorrhage is more characteristic of ruptured varix than of gastric ulcer Varicose veins about the cardia have long been known as a condition associated with cirrhosis of the liver and are likely to cause death by sudden rupture. This condition is met with chiefly in males who are or have been addicted to the habitual or excessive use of alcoholics. Indigestion is a common complaint in cirrhosis, but it is rarely of the ulcer type. The distinguishing feature of this hepatic indigestion is a feeling of fullness in the upper abdomen, a feeling of constriction, which is constant but much increased after the ingestion of meat. This is not associated with pain simulating ulcer with any evidence of gastric fermentation, with eructations of gas or with any suggestion of alteration in the motility of the stomach. This is simply the subjective impression of an overdistended portal circulation analogous to the gastric discomfort of non-compensated lesions of the mitral valve. On the insistence of three medical colleagues, I recently operated upon a middle aged man whose recital of this symptom rather than the associated hematemesis led me to disagree with their diagnosis of duodenal ulcer This patient's history lacked the pain typical of ulceration indeed there were few symptoms, except several attacks of hematemesis and the peculiar hepatic indigestion to which I have referred. Operation showed a cirrhotic liver — not ulcer Ten days after the operation the patient succumbed to a fatal hematemesis Autopsy revealed a perforated varicose ulcer of the lower end of the oesophagus. Cases are occasionally met with in which none of the usual etiologic factors of cirrhosis exist, and the signs may be no less obscure. Taylor has reported such a case, in which gastro-enterostomy was done in the belief that ulcer existed. There was slight temporary improvement, followed by recurrence of the bleeding and death. Not long ago a similar case came to us for hematemesis, who had had a gastro-enterostomy

done previously by one of my Philadelphia colleagues. I refused to operate, believing the case one of cirrhosis. Patient recovered and has since been at the hospital for similar attacks. I have found no cases in the literature in which a gastric drainage operation has benefited for any appreciable length of time the hæmorrhage due to cirrhosis of the liver. The cirrhotic is a poor subject for surgery even exploratory and the futility of surgery in the emergency of hæmorrhage from œsophageal varices is the cause of considerable chagrin to the surgeon who opens the abdomen for the cure of this variety of hæmorrhage. Of 149 cases of cirrhosis of the liver admitted to the medical wards of the Episcopal Hospital of Philadelphia, 6 per cent gave a history of bloody vomitus.

The hæmorrhage due to malignant disease of the stomach, like that of ulcer is not commonly sudden and profuse. In the early stages it is slight, even occult in the stools. It is more likely to be persistent than the hæmorrhage of ulcer and tends to become progressively more marked. The hæmorrhage from malignant ulceration is as a rule, a slow seepage which gives rise to little systemic effect of bleeding, but reveals itself by the process of coffee-ground vomitus or melæna. Sudden hæmorrhage is one of the modes of termination of gastric carcinoma, but in all but the rarest instances such an event is but the termination of an already established and evident malignant cachexia.

When hæmorrhage is a result of neoplasm it is rarely remediable by surgery though occasional success may be attained in the case of slowly metastatizing malignant growths or in ulcerated benign tumors of the stomach. During the past year there occurred in the practice of one of my Philadelphia colleagues a case of death from hæmorrhage of an ulcerated myoma of the stomach. The growth was round encapsulated and about 6 cm. in diameter and its growth was chiefly inward into the cavity of the stomach, much like a submucous myoma of the uterus. On the innermost surface a typical punched out round peptic ulcer had formed, from which successive hæmorrhages reduced the patient to a condition of such anæmia that the case was regarded as one of the pernicious variety with bleeding from the mucosa of the intestinal tract. Autopsy revealed a tumor of the gastric wall, easily capable of excision.

Gastrorrhagia dependent upon blood dyscrasias must be kept in mind, although they rarely offer serious difficulties in diagnosis. Our understanding of active blood vascular congestion as a cause of profuse hæmatemesis is one of the monumental gifts of living pathology to clinical surgery.

Operation may be indicated in gastric carcinoma when hæmorrhage chances to be an early symptom and there is still hope of cure or it may be indicated in advanced or otherwise inoperable cancer when hæmorrhage is so profuse and persistent as to shorten even the period of prognosis given to cancer. In this case the measures to be adopted are excision, gastro-enterostomy or jejunostomy in accordance with the pathology found at operation. Kammerer has reported a case of gastric carcinoma with profuse hæmorrhage in which gastrojejunostomy stopped the bleeding and the patient lived almost a year. Tixier records a similar case in which hæmatemesis ceased after gastro-enterostomy and he was able a month later to resect the growth. In my opinion appropriate cases of this sort will be excessively rare, as I am greatly opposed to operations being done on cases which are inoperable from the standpoint of cure. I have seen too many instances where the expected benefit failed to materialize and the last state of the patient was worse than the first. And even in the case of temporary improvement, the subsequent disappointment is often but the more keen. The true interests of surgery also are retarded by what the laity considers a failure of our art, and attention is diverted from the crux of the question namely early diagnosis and treatment.

It would seem to me that sufficient observations have been accumulated concerning the prognosis of gastric hæmorrhage not due to trauma, with or without operation, to confine the indications for operation to one group of cases, namely chronic benign

ulcer It is beyond doubt that lives have been saved by surgical intervention in chronic ulcer That the chronic ulcer which slowly erodes its way into an important vessel will, in the majority of instances, cause fatal hæmorrhage is established by clinical and pathological evidence But four most essential questions remain to be settled (1) The recognition of suitable cases (2) the time to operate (3) the type of operation to be performed (4) the proof of our position by mortality statistics.

1 The diagnosis of chronic eroding ulcer must be clear to warrant operation in acute gastric hæmorrhage Not only must the conditions which simulate it be considered and eliminated so far as possible but we must be in possession of a history which points strongly toward the existence of chronic ulcer The most important point is a history of long continued persistent painful indigestion definitely related to the ingestion of food. There should be a certain irregular periodicity but the intervals of freedom from symptoms should be only weeks, not months or years The methods of relief from pain are often important. The constant use of alkaline remedies, of additional food when pain comes on of gastric lavage, point toward ulcer In some cases small hæmorrhages have occurred previously and in some fortunate cases the patient has already had a well-founded diagnosis of ulcer made by his medical attendant.

The surgeon must not be considered as the mechanician only but particularly as the master diagnostician made such by frequent excursions into the pathological fields with which the abdominal cavity is too often so rich. Like the internist, the surgeon must not put his faith in obscure cases to the bismuth meal, the X ray and the fluoroscope, but to the aseptic scalpel which makes the abdominal wall transparent

Granted that we are in the presence of an acutely bleeding chronic ulcer when should we operate? Many of these hæmorrhages are so rapid and alarming that the patient when first seen is practically exsanguinated Savariand stated that 8½ per cent of the victims of hæmorrhage died before operation was possible. In many others hæmorrhage ceases just short of death It is manifestly improper to attempt operation in acute collapse. Surgical judgment must be invoked to determine the possibility of successful operation, and in general it is my opinion that we should err on the side of conservatism As Paterson has pointed out, the low blood pressure and collapse of hæmorrhage is favorable for arrest of the bleeding but unfavorable for surgical intervention

General measures for the treatment of internal hæmorrhage should be rigidly applied Morphia hypodermically is the most valuable. Absolute quiet is essential. The foot of the bed should be elevated. Nothing not even ice or a drop of water should be given by mouth Saline solution should be given by rectum or in greater emergency by hypodermoclysis or intravenously If death is not too imminent, fluid should not be supplied too quickly lest it raise the blood pressure dislodge the clot, and favor further hæmorrhage by the dilution of the serum. The return of the patient to a normal circulatory condition should be carefully watched In this point I would differ from the majority who wait for further hæmorrhage before deciding to operate The shock of even a moderate acute hæmorrhage is temporarily great but may be quickly recovered from. If we have the diagnostic evidence of chronic ulcer it is at this point that operation should be undertaken A second hæmorrhage is far more depleting than the first, and, moreover throws but little light upon the pathology which is the essential point at issue, since recurrent hæmorrhages are common in the other varieties of gastric hæmorrhage

The chapter on the methods and results of operation we must all unite in making The ligature remains the premier method of hæmostasis, but the advisability and necessity of its application in profuse intragastric bleeding becomes a matter of most refined discrimination between the several causes of such bleeding

It is true these are rarely surgical emergencies in the sense that ruptured ectopic pregnancies are emergency cases, but to withhold the aseptic scalpel in a definite

proportion of these cases is a practice as erroneous as the gynecologic suggestion to await reaction in the dying woman. My experience has been fortunate in operative cases. I have operated upon 10 cases of acute gastric hemorrhage. In 2 cases I excised the ulcer by pylorectomy one recovered one died. In 3 cases of duodenal ulcer I made a posterior gastrojejunostomy and plicated the duodenum over the ulcer All recovered Five cases of pyloric ulcer were treated by simple gastrojejunostomy All recovered Two cases of hemorrhage have died in the wards during the past six years while reaction was awaited. In one the coronary artery was eroded, in the other the gastroduodenal was opened.

In reviewing the literature during the preparation of this article, 33 cases of operation for acute gastric hemorrhage, exclusive of my own, were collected since the independent reviews of Tuffier and Connell in 1905 In these 33 cases there were 8 deaths (24.2 per cent) This is to be compared with Tuffier's collective mortality of 36 3 per cent in 1905 with Rodman's mortality of 37 5 per cent in 1901 and with Savariand's figure of 62 6 per cent in 1898

It is easily seen that the mortality is continually becoming less a fact attributable, doubtless, to various causes, but in part at least to increasing accuracy of recognition of the proper type of cases in which surgery is to be employed. May we not hope that our skill in diagnosis and resources of treatment may be so increased that we may be able to select and save a greater percentage of those who are seized with sudden gastric hemorrhage? Many problems remain for surgical solution but it must be our constant aim to build a symptomatic superstructure on the foundation of our knowledge of the living bleeding tissues. In this wise we can guide aright the steps of professional judgment, crippled with that irrationality inseparable from terminal or dead pathology

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ON THE ETIOLOGY AND BACTERIOLOGY OF LEUCORRHŒA

BY ARTHUR H CURTIS M D CHICAGO

From the Memorial Institute for Infectious Diseases aided by grant from the Fanger Memorial Fund

OUR knowledge of leucorrhœa is unsatisfactory and incomplete. The majority of physicians neither appreciate the gross aspects of the condition nor discover the locality from which discharges arise, practically none of us possesses an adequate knowledge of the bacteria involved, and most clinicians admit that their curative efforts yield poor results.

This study was begun with the desire to learn more about the factors concerned in leucorrhœa, with especial reference to bacteriology in the hope of thus leading to new principles in treatment.

The work includes the following subdivisions

I A consideration of where discharges originate

II. The characteristics of leucorrhœal discharges.

III. The bacteriology of leucorrhœa. This embraces

(1) Notes on the literature (2) a brief description of the material used and nature of this study (3) the characteristics of fresh smears and of cultures (4) organisms of chief interest in the cases studied.

IV Discussion and conclusions.

I—WHERE DO DISCHARGES ORIGINATE?

It is essential to locate the focus of chronic infection with which the leucorrhœa is associated. Most physicians believe we have here to do with an infection of the uterus hence the usual diagnosis of endometritis and the frequent use of the curette in the hope of effecting a cure through removal of the infected endometrium

To determine whether uterine infection actually exists in leucorrhœal cases, cultures

Read before the Chicago Gynecological Society December 10 1913. See discussion on p. 303.

were made from the uterus obtained at operation in several instances, as well as from scrapings from a dozen patients with leucorrhœa. Exclusive of two cases of pyometra, caused respectively by a fibroid polyp and by carcinomatous obstruction of the cervix, in no instance was a leucorrhœa-like discharge obtained from the uterus. Fresh preparations, as well as cultures, failed to reveal the presence of bacteria.

In over 20 patients the cervix was exposed to view and observed for evidence of leucorrhœal discharge, in many the cervix was dilated to assure free drainage during the period of observation, but in none was there evidence of anything more than a mucous discharge from the uterus.

These results, namely the absence of bacteria in uterine scrapings from leucorrhœal cases the negative results of cultures from the endometrium, and the failure of persistent attempts to discover a leucorrhœal discharge from the uterus indicate that purulent discharges are formed in the lower genital tract and rarely consist of bacteria laden material from the uterine cavity Mucus, on the other hand, arises from the region of the cervix, especially when it is hypertrophied, everted, or eroded

II—CHARACTERISTICS OF LEUCORRHŒAL DISCHARGES

The flow is either ropy and mucoid (from the cervix) or of a purulent nature An admixture of mucoid and purulent material is common. A purulent discharge may be thick and creamy or watery in character Without assignable cause, a creamy discharge may become watery or the reverse may be true with decrease in the consistency there is, as a rule, a corresponding increase in amount. In some instances the quantity of flow is surprisingly great. Such patients are not only forced to make constant use of napkins, but find it necessary to change during the day to avoid soiling their linen

Doderlein considers a weakly acid or alkaline reaction characteristic of leucorrhœa. I have most often encountered a frankly acid, much less frequently a neutral or slightly alkaline, reaction.

III—BACTERIOLOGY OF LEUCORRHŒA

1 *Contributions to the literature.* The bacteriology of leucorrhœa has received but scant attention. Those studies which have touched on this question have been chiefly concerned with the part played by the vaginal flora in the production of puerperal infection.

In 1892 Döderlein[1] described his vaginal bacillus, the only organism he considers a normal inhabitant of the vaginal canal This he found to be a non motile, non-pathogenic, anaërobic, facultative aërobic bacillus, which forms drop-like colonies on glucose-agar These bacilli of Döderlein really represent a class of similar large gram positive bacilli, rather than one distinct kind of organism.

Menge and Krönig[2] made an interesting study of the bacteriology of the female genitalia. They did not, however give special consideration to the bacteriology of leucorrhœa. The majority of bacteria in vaginal secretions they found to be anaërobes, some of which grow on acid media as facultative aërobes. Examination of aspirated material from the cervix and uterine cavity led to the conclusion that bacteria do not live in the normal uterine cavity and the same holds true in most instances of chronic endometritis

Wegelius studied the bacteriology of post partum discharges and classified the organisms found. Obligate aërobes, such as the pseudo-diphtheria bacillus, were present in the vulva, but rarely in the vagina. The coli group was represented in 40 per cent of cases, but it also was almost invariably limited to the vulva.

Heurlin also carefully classified the bacteria found by him in febrile puerperal cases.

2 *Material and scope of study* Seventy five patients have been studied of these 35 had profuse leucorrhœa. All were requested to re-

[1] Döderlein. Das Scheidensekret und seine Bedeutung für das Puerperalfieber Leipzig 1892

[2] Menge und Krönig Bakteriologie der weiblichen Genitalien Leipzig, 1897

Wegelius. Bakteriologische Untersuchungen über weiblichen Genitalsekretion während der Entbindung etc. Arch. f. Gynäk. 1900 [illegible]

Heurlin. Bakteriologische Untersuchungen über Komplikation im Genitalkanale der fieberhaften Wochenbettes mit Berücksichtigung der Genitalsekretion im Laufe seines Lebens. Helsingfors, 1900

turn for frequent examination, and to avoid douches and other sources of local contamination for some days preceding the cultures.

Material for culture was obtained from various parts of the vagina notably from the vicinity of the cervix, a sterile vaginal speculum and platinum loop being employed in obtaining the discharge Fresh preparations were also stained for study

The discharges were cultivated on blood agar and ascites-blood-agar as well as on other media, under both aërobic and anaërobic conditions Isolation of the various anaerobic strains was found to be impossible when only one series of dilutions was employed The growth, therefore, on those tubes which showed most luxuriant development was reinoculated in varying dilutions upon fresh sets of media In this way some organisms were isolated in the first set of cultures, while others were obtained in subsequent dilutions in subculture It has been necessary to repeatedly obtain fresh material for cultures from almost every patient in order to isolate the various organisms present

3 *Characteristics of fresh smears and of cultures* The uncontaminated vaginal secretion contains a preponderance of large, gram-positive vaginal bacilli" of Doderlein (Figs. 1 and 2) The usual case, however yields a varying number of contaminating organisms. Mucoid secretion notably in the absence of local inflammation presents a picture which tends to agree with the normal.

In purulent discharges we find the greatest variations in flora and encounter much difficulty in classifying the bacteria present. In fresh preparations (Fig 3) gram-negative bacilli tend to predominate. Gram-positive cocci are regularly present they occur most often in pairs, and may vary considerably in size. Gram negative diplococci likewise varied in size are less common and are less numerous when present

A determination of those forms which are noxious as contrasted with those of minor importance requires a study and classification of the chief types of bacteria found in leucorrhœal discharges. Such a classification of bacteria common to leucorrhœa is not available and is unquestionably needed

Anaërobic blood-agar slants show an elevated roughly beaded, fairly well confined but rich growth. Control aërobic slant cultures commonly develop poorly in comparison Aërobic blood agar plate cultures tend to yield a very poor growth

From the characteristics of organisms as they appear in fresh preparations also from the relatively rich growth in anaërobic cultures, as compared with control aërobic cultures, it is evident that the greater number of bacteria in leucorrhœal discharges are anaerobic in nature. It does not necessarily follow that fewer aërobic strains are obtained for these are easier of cultivation. Many anaërobes, on the contrary do not thrive on artificial media and others which grow well in mixed culture cannot be isolated.

It is noteworthy that the cultures made from the vulvar region in contrast with higher vaginal cultures contain more aerobes, notably B coli, staphylococci and pseudodiphtheria bacilli Consequently high vaginal cultures from patients who are subjected to frequent douching show contamination with similar bacteria, with profuse growth on aerobic media

In order to observe the virulence of leucorrhœal organisms, animals were injected subcutaneously intravenously and intraperitoneally with the vaginal washings from four most pronounced cases Noteworthy evidences of toxicity were not found. Several rabbits and guinea pigs injected with fresh cultures from similar material were likewise unaffected.

4. *Organisms of chief interest in cases studied* It must be remembered that during the period of twenty months covered by this work the time consuming character of the task has allowed a study of only 75 cases, 35 of which had well-marked leucorrhœa. Subsequent findings will enlarge the list of organisms and may be expected to somewhat alter the views concerning the significance of certain bacteria

BACILLUS Anaërobic cocco-bacillus (Fig. 4) Fairly plump bacilli, typically 2 to 3 microns in length. Extreme variations in length are common Usually single they also frequently are found in long chains in which successively occur coccus-

shapes, bacillus forms, and long thread-like varieties. Attempts to secure individual organisms were made by Dr. V. H. Moon according to Barber's method, but were unsuccessful because of peculiar conditions of surface tension when in suspension. The bacillus is destained by Gram's method, but stains readily with the usual aniline dyes. These bacilli are often present in cases with profuse creamy discharge. Growth is obtained only under anaerobic conditions. Best development occurs on blood-agar and ascites-blood-agar on which the colonies are translucent and beaded. A poor growth is obtained on ascites-agar; on other media cultures remain undeveloped. Subcutaneous and intraperitoneal injections into rabbits show no evidences of pathogenicity.

BACILLUS 2. Anaerobic bacillus fusiformis (Figs. 5 and 6). These bacilli represent a group allied to Bacillus 1. Extremely pleomorphous, they are most often oval or elongated in shape, with faintly colored bodies and deeply staining ends. Gram' stain is not retained. Nodular, twisted, and globular forms are frequent. A single culture may yield organisms of only one shape, i. e., barrel shaped bacilli with deeply stained ends, from subculture of which is obtained an endless variety of forms. Anaerobic conditions are necessary for growth. Best development is obtained on blood agar and ascites-blood-agar on which the colonies are large, round, and opaque. On serum-agar moderate growth occurs. Some strains develop well on alkaline agar. On other media growth is limited. Gas is seldom produced. Those strains injected into animals were non-virulent.

BACILLUS 3. Anaerobic curved bacillus (Figs. 7 and 8). In a recent description the distinctive features of this organism have been given in detail. Gram-negative, motile, flagellated, crescentically curved and quite uniform in size, it is easily identified. The bacillus is centrally plump, with tapering or rounded ends and is from 3 to 5 microns in length. Flagella are present. They are subject to much variation in number, in arrangement and in point of attachment. In hanging-drop preparations, peculiar rapid, corkscrew motion is observed. Cultures grow only anaerobically. On blood agar a distlike coat composed of minute translucent colonies occurs; on ascites-agar, alkaline agar and glucose-agar a slow growth is obtained. Cultures on plain agar, broth, litmus milk and potato fail to develop. In cases of profuse leucorrhœa these bacilli are sometimes in excess of all other bacteria. Following abortion they occur in large numbers. Agglutination tests with the patient's serum were made in one case and proved negative. Pure cultures injected into rabbits are without effect.

BACILLUS 4. A pleomorphous anaerobic bacillus (Fig. 9). A straight or slightly curved bacillus, fairly thick, irregular in outline, and varied in length from 3 to 6 microns. Often single it also occurs in pairs, sometimes end to end but more commonly placed at an angle. Knobbed and root shaped forms are frequent. The bacillus stains well but slowly with the usual aniline dyes. Gram stain is not retained. Best growth is obtained anaërobically. In aerobic cultures there is a very sluggish, poor development, characterized by the appearance of curved, blunted, and knotted forms. On anaerobic blood-agar isolated colonies are translucent and at times plate-shaped, with spreading borders. Thickly growing colonies are similar in appearance to those of non-hæmolysing streptococci. Organisms from blood agar condensation fluid are non-motile. A poor growth is obtained on litmus-lactose agar and on ascites-agar; translucent growth appears. On other media cultures do not develop. This organism is present not infrequently but is ordinarily difficult to isolate and grow in pure culture.

BACILLUS 5. Anaerobic short, usually paired bacillus (Fig. 10). This bacillus is one of a group of often-present, similar organisms, of which Bacillus 6 is another example. Organisms identical with or closely allied to these two bacilli are found in almost all cases of leucorrhœa. There is at times some difficulty in distinguishing them from diplococci. Typical forms of Bacillus 5 occur both singly and in pairs. Globular end enlargements, sometimes double and giving rise to ant-like shapes are frequent. Most stains are taken readily. Gram stain is retained either very poorly or not at all. Forty-eight hour anaërobic blood-agar cultures contain translucent, round, slightly elevated non-hæmolysing colonies. On ascites-agar the growth is similar. A poor development occurs on 0.5 per cent alkaline agar and growth on 1 per cent acid-agar is rarely obtainable. Only one strain produced an acid reaction in litmus-milk. Broth remains sterile. No gas formation occurs in glucose agar. The organisms of this group are strict anaerobes.

BACILLUS 6. Anaerobic small, gram negative bacilli (Fig.). Frequently present but repeatedly lost during isolation. Satisfactory sets of cultures were not obtainable. Upon anaerobic blood agar occurs a delicate, dust-like, translucent growth. Cultures on other media do not develop. Bacilli of this type (see Bacillus 5) small, Gram-negative, mostly paired, two or three microns in length, are frequently found in large numbers in fresh smears and in original mixed cultures. Because of the inconstancy of colonies, delicacy of growth, and poorer development when isolated a differential study of these forms is still incomplete.

BACILLUS 7. Anaerobic bacillus bifidus (Fig.). Peculiar branched forms characterize this bacillus. Y and angular types are frequent. Deeply staining nodular and enlargements are common. There is considerable variation both in length and in breadth. The smaller organisms stain lightly are thin and often slightly curved. Growth does not occur aerobically. On ascites-aga there is an excellent translucent granular development. On

blood-agar similar growth occurs. Nodular forms are frequent on slightly acid-agar and still more numerous on alkaline-agar. Acid is not produced. Gas formation does not occur in glucose-containing media. Bacillus bifidus has been found very few times in this series.

Bacillus 8. Pseudodiphtheria bacilli (Fig. 13). Especially the large beaded types of pseudodiphtheria bacilli are found. Evidence indicates that when these bacilli are present in the upper part of the vagina it is chiefly in patients who douche frequently or who have extreme grades of laceration or elaxation of the vulvar region. Their usual habitat is in the region of the vulva. When forced up through mechanical means or when relaxation favors entrance, they are to be found in high vaginal cultures. The relationship of these bacilli to leucorrhœa requires further study.

Bacillus 9. Bacillus coli. Bacilli of the colon group are present less commonly than is popularly supposed. About the vulva they are frequent. In the upper vagina they are numerous in those patients who make free use of douches. The type most frequently isolated acidifies but does not coagulate milk. In morphology, motility in hanging-drop and reaction on various media, there are no other noteworthy variations.

Other bacilli. Bacilli of the mycoides and subtilis groups are isolated from patients who have persistently and frequently made use of douches. In smears they are most commonly present in only small numbers, and in plate cultures show but few colonies. Yet in some instances plate cultures are predominated by their rapid growth. Those whose hygienic surroundings are such that sterilization of douche solutions and general opportunities for cleanliness are unsatisfactory are the chief ones who harbor these germs.

Bacillus proteus vulgaris, black pigment-producing organism (found elsewhere), influenza-like bacilli, small aerobic bacillus, and some other unclassified forms have been encountered also.

Coccus 1. Anaerobic streptococcus (Fig. 14). In fresh vaginal smears these cocci are practically always in the form of diplococci. On artificial media they form very long chains composed of oval or lancet-shaped cocci in diplo arrangement. The cocci of different strains are subject to much variation in length and may assume extremely long bacillus-like shapes. Good stains are obtained with the usual aniline dyes. Gram stain is retained.

Growth occurs only in anaerobic cultures. Best results are obtained on blood-agar media, on which the growth characteristic of streptococci in general. Hæmolysis does not occur. When cultures are opened, disagreeable but not particularly foul odor is noted. A fair growth is obtained on ascites agar. Some strains show a poor development on alkaline-agar and on slightly acid agar. On glucose-agar growth is poor or wanting. Gas is rarely produced. Litmus milk is not acidified. Broth cultures remain clear and without precipitat

Cultures on blood-agar which was made from a patient's blood showed good growth, but microscopically were found diplococci or cocci only in short chains, whereas control blood-agar cultures contained chains of enormous length. Opsonic and agglutination tests give no indication of immunity. A study of the relationship of anaerobic to aerobic streptococci through determination of the point of opsonic extinction reveals that standard antistreptococcic serum evidently has very little, if any, power of sensitizing anaerobic streptococci.

To ascertain the virulence of various strains, several guinea pigs and rabbits were injected both subcutaneously and intravenously, with large doses of organisms. There was no evidence in any case of more than temporary distress.

Coccus 2. Anaerobic staphylococcus (Fig. 15). This minute coccus may be either in small clumps or isolated. It has been obtained only twice in pure culture. Several strains thought to be anaerobic staphylococci have finally grown aerobically. On blood-agar, a poor growth develops. Gram's stain is not retained.

Coccus 3. Hæmolyzing aërobic streptococcus. In smears of fresh material, these cocci, like the anaërobic streptococci, exist most often as diplococci. In aërobic cultures the organism promptly grows out into long chains. The proportionate number of hæmolyzing streptococci in the vagina is seldom great, but their ease of cultivation often yields a surprising number of colonies on artificial media. The chief features of growth agree closely with those common to streptococcus pyogenes. The scattered arrangement and small proportionate number of these cocci in smears of fresh material lend weight to the belief that they play an insignificant rôle in the production of leucorrhœa.

Coccus 4. Non-hæmolyzing aërobic streptococcus. Non-hæmolyzing vaginal streptococci, like the other varieties of streptococci, when observed in fresh discharges are rarely found in chains. On artificial media they form chains, the individuals of which commonly have a diplo-arrangement. Some strains consist of very large cocci, 1 micron or more in length and 1¼ microns in breadth. The larger types are often in pairs, fours, or short chains, intermingled with which are chains of greater length.

Coccus 5. *Aërobic staphylococcus.* Contrary to the general impression, aërobic staphylococci are not numerous in the upper vagina in unmanipulated cases of leucorrhœa. As they are common in the vulvar region, the oft-repeated and careless use of douches greatly increases their frequency. A few colonies are often present, but they are rarely in numbers which signify that the rôle played by them is more than a minor one.

Coccus 6. Gonococcus. In smears of leucorrhœal pus the gonococcus resists positive identification. It can be differentiated from other forms only if found in considerable numbers and in typical arrangement. From its favorite locations it is



Fig
Fig 4

Fig
Fig. 5

Fig. 1
Fig 6

Fig Typical smear from uncontaminated vagina containing pure growth of Döderlein bacilli. Gram stain. 500. *Fig. 2. Smear from an uncontaminated vagina* showing variation in size of Döderlein bacilli 500. Fig 3 Bacillus Showing pleomorphism of bacillus fundiliformis in pure culture Carbo-gentian-violet. 500 Fig 4 Bacillus Pure culture anaerobic cocco bacillus. Transition from coccus to long bacillus forms is well shown Carbo-gentian-violet. 500 *Fig. 5.* Bacillus 2. *Anaerobic bacillus fundaliformis* in pure culture. Carbo-gentian-violet. 500 Fig 6. Bacillus Showing pleomorphism of bacillus fundaliformis in pure culture. Most often oval or elongated in shape Carbo-gentian-violet 500

however obtained frequently enough t reveal it enormous importance as the primary cause of subsequently developing leucorrhoea.

It is planned to consider thoroughly the gonococcus-like flora of the lower genital tract. The classification of Bumm, which is probably the best available, leaves a gap in our knowledge of how t satisfactorily differentiat gram-negative diplococci

IV DISCUSSION

Certain conditions predispose to leucorrhoeal discharges. Important among these are lacerations and displacements, changes in the cervix which cause increased mucous secretion Infections complicating pregnancy and gonorrhoea.

Although we are mindful of these predisposing factors, our interest centers at present in the various bacteria. *Especially do we wish to know whether bacteria are the cause of leucorrhoea or merely play an unimportant and non-essential rôle*

Fresh preparations from the uncontaminated vaginal canal show almost exclusively Doderlein's large, gram-positive vaginal bacilli Many clinically normal cases, e g healthy married women also reveal chiefly bacilli of this type.

The more patients deviat from the absolute normal, with only Doderlein bacilli, i e the greater the tendency to discharge formation and the more purulent its nature, the more nearly do the bacteriologic findings resemble in character the picture presented by pathological cases.

Bumm Der Mikroorganismus d. gesunden Menschen. Wiesbaden, Monograph 1895

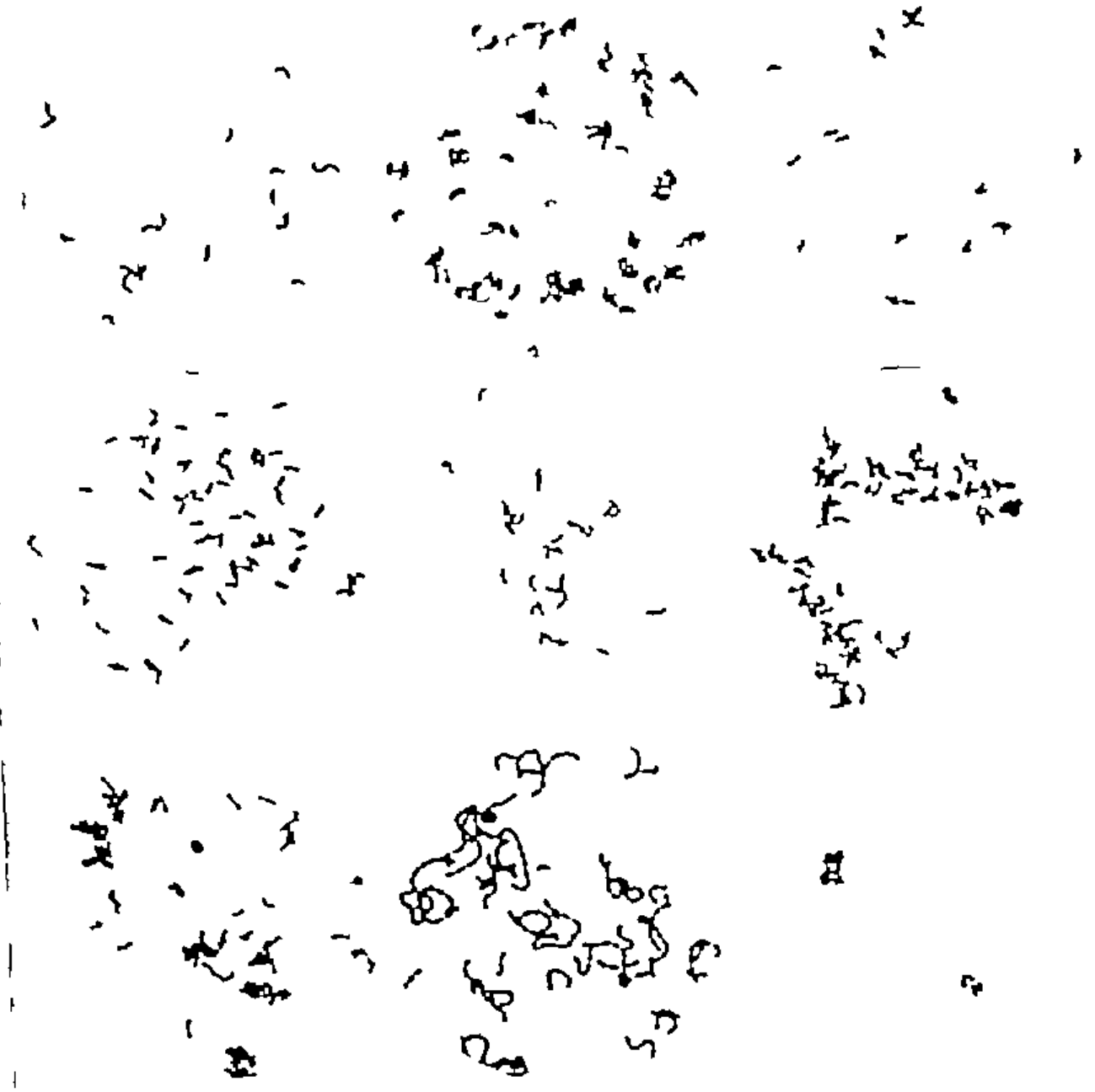


Fig. 7
Fig.
Fig. 5

Fig. 8
Fig.
Fig. 14

Fig. 9
Fig.
Fig. 15

Fig. Bacillus 3 Motile curved anaerobic bacillus (Carbo-gentian violet 200 Fig. 8 Bacillus 3 (same as preceding) Stained by Zettnow silver nitrat method shows flagella 000 Fig. 9 Bacillus 4 Anaerobic knobbed and rod shaped forms are prominent here Carbo-gentian violet 200 Fig. Bacillus 5 Anaerobic usually paired This is one of group of very similar organisms Carbo gentian violet 200 Fig. Bacillus Anaerobic small gram negat frequently present but repeatedly lost during isolation Fig. 2. Bacillus 7 Anaerobic bacillus bifidus Pure culture and angular forms are characteristic Carbo-gentian-violet 200 Fig. 3 Bacillus 8 Pseudodiphtheria bacilli of type common in vaginal regions Gram 200 Fig. 4 Coccus Anaerobic streptococcus Note diplo-arrangement and large forms 200 Fig. 5 Coccus Anaerobic staphylococcus Carbo gentian violet 200

Characteristic of smears and cultures from leucorrhœal discharges is the preponderance of anaerobic organisms Certain types of anaërobic bacilli are predominant In the cases studied types represented by Bacilli 6 5 2 1 and 3 have been most frequent. Gram positive diplococci are always present. Often they are in considerable numbers but not in groups or chains and never in excess of bacilli. These facts bespeak a somewhat passive part in leucorrhœa production. *Streptococci are almost never found in fresh preparations but develop from diplococci on artificial media* This fact has heretofore apparently been overlooked Diplococci develop in culture into long-chained anaërobic streptococci in probably 30 per cent of the cases. Aërobic streptococci are similarly frequent in culture

Evidence indicates that the anaërobic flora notably its bacilli is of paramount importance An increase in the relative number of aerobes is roughly proportional to the amount of contamination through douches and other external influences. Staphylococci are often found but they are notable chiefly for their small number If we exclude those cases in which inflammation is acute it is doubtful whether bacilli of the colon group actively participate in the production of leucorrhœa

The rôle of the gonococcus deserves careful consideration. Gonorrhœal infection is the exciting cause of leucorrhœa in the vast majority of women who have never been pregnant. After creating conditions favorable for the development of other organisms which are accompanied by profuse purulent discharge in an astonishingly large percentage of cases, the gonococcus so completely disappears that it is not demonstrable through any means at our command. This suggests that a chief part played by the gonococcus in chronic leucorrhœa consists in preparing the soil for the leucorrhœa producing anaërobic organisms.

A final factor of importance in determining the rôle of bacteria in leucorrhœa is shown by the results of treatment Through bacterial or vaccine therapy alone as will be reported later some cases with constant chronic discharge have been markedly affected both systemically and locally

These views of leucorrhœa may be summarized as follows

1 The uterine cavity tends to remain free from bacteria in cases of leucorrhœal infection, but mucous secretion from the cervix may promote the development of purulent discharges

2 The usual seat of formation of purulent discharges is the lower genital tract.

3 In unmarried women gonorrhœal infection precedes the development of chronic leucorrhœa in the majority of instances. A chief part played by the gonococcus consists in preparing the soil for other organisms.

4 The great contingent of leucorrhœal bacteria consists of anaerobes of which gram-negative bacilli form a large proportion. It is highly probably that these bacteria play an active part in the production and maintenance of leucorrhœa Common aerobic organisms, such as B coli and staphylococci, seem to be of minor importance

For material furnished and for interest manifested in this work I am indebted to Dr [illegible] J [illegible]

ABSCESS OF THE TESTICLE[1]

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AS an occasional complication in various diseases, such as typhoid fever, glanders, syphilis, tonsillitis, small pox and mumps, or as a sequel to some septic process elsewhere in the body, acute orchitis, with or without abscess formation, has been recognized from early times. But as a primary disease without a demonstrable focus from which it might arise, abscess of the testicle is of great rarity. It is this type of orchitis which we propose to discuss. We wish further to make it clear that we are dealing here only with abscess of the testicle and not of the epididymis.

Although so far as we are aware the records of the Massachusetts General Hospital contain no undoubted example of this type of orchitis except the one to be reported, the writer has been fortunate enough to see two others in his own practice. Also in a somewhat scanty literature on the subject we have met with only two or three similar cases.

CASE. A. P., 61 years old, married, builder. Admitted to the genito-urinary service of the Massachusetts General Hospital on December 8, 1909.

Family history and past history negative except as given below. Alcohol to excess as a young man. None for many years. Strenuously denies venereal disease.

When a boy he had swelling of the left side of the scrotum, not very painful or tender, and of few days' duration. Another similar attack fifteen months ago lasting two or three days. No known cause. These attacks were not associated with urethral discharge or urinary symptoms.

October 9, the patient caught severe cold. It developed much frequency of micturition—every two or three hours by day, every hour by night. Considerable dysuria and tenesmus, but no difficulty of urination or retention. Says the urine was cloudy. After straining at the end of micturition, patient noticed discharge from the meatus. None between times. Urinary symptoms subsided in about two weeks.

Coincident with the disappearance of the urinary symptoms, which was about three weeks ago, patient noted swelling of the left scrotum and this has steadily increased in size and tenderness. Very little pain till recently. Now the pain is heavy, dull and dragging. Frequency of urination is five or six times by day, three or four times by night. Weight two months ago, 211 pounds; now 195 pounds. No headache or vomiting.

Other than the condition of the left scrotum, physical examination, including prostate and vesicles, showed absolutely nothing abnormal, the only point worth noting being the presence of an extensive pyorrhœa alveolaris and a considerable redness of the throat. The temperature at time of entrance was 99.6° F. Systolic blood pressure was 165 mm. of mercury. The Wassermann reaction and the gonococcus fixation test were negative. The urine was clear and sparkling, contained no shred or albumin, and was sterile to culture. Guinea pigs inoculated with it were reported later as negative for tuberculosis.

The penis and right side of the scrotum were normal. The left scrotum presented as a large, rounded tumor, about four inches in diameter, the skin extending well up into the inguinal canal. Except on the anterior surface the skin was much thickened and brawny. Anteriorly the tumor was fluctuant with red shiny, adherent skin. The tumor was smooth, elastic, moderately tender. Testis and epididymis could not be distinguished. The whole spermatic cord was much thickened, the vas itself not being identified. Dr. Hugh Cabot, who saw the case with me, made a diagnosis of epididymitis with abscess formation.

Immediate operation was advised and performed by the writer. The fluctuant area of the tumor was incised, with the escape of about four ounces of thick, yellow, odorless pus, mixed with necrotic tissue. This pus showed in pure culture the bacillus mucosus capsulatus and the streptococcus. Exploration with the finger showed that this pus came not from the tunica vaginalis, which had not been opened, but from the surrounding tissues which were sloughing and necrotic. The greatly thickened tunica was then opened with the escape of two or three ounces of thick, yellow pus, mixed with necrotic tissue in which were seminiferous tubules. This pus contained the bacillus mucosus capsulatus in pure culture. Attempts to separate tunica from testis revealed dense adhesions between them. The testicle now presented in the incision and was found to contain an abscess cavity the size of an English walnut, from which still more pus and necrotic testicular tissue could be expressed. The epididymis was not seen, but was felt posteriorly, thickened and indurated. The whole spermatic cord was much thickened. This was tied off in sections and divided near the external inguinal ring,

[1] Read before the American Association of Genito-Urinary Surgeons, Washington, D. C., May 4 and 5, 1911.

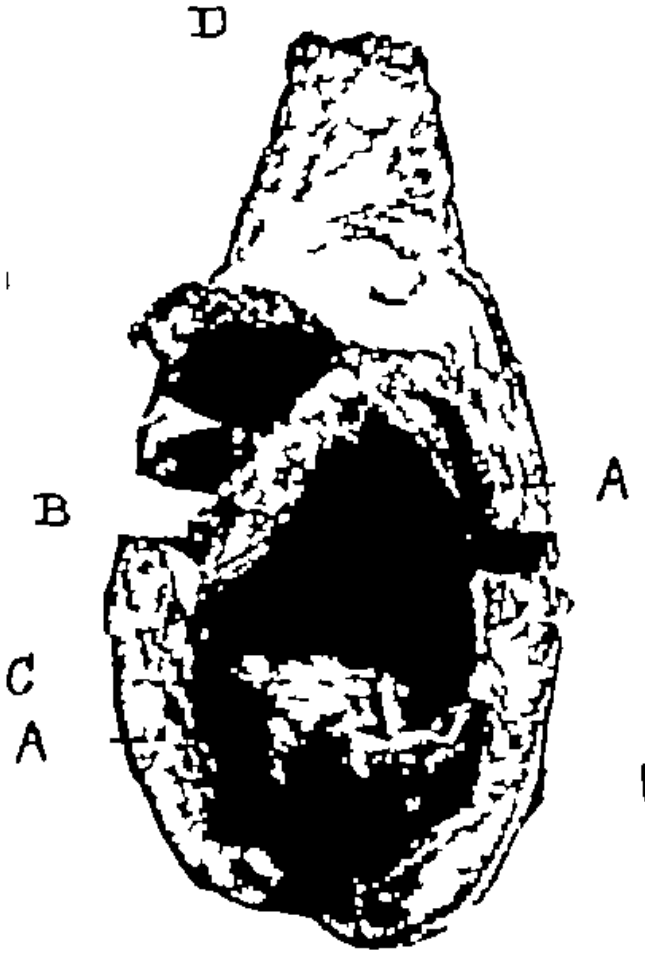


Fig. — Anterior view.

Section through the wall of an abscess of the testicle. A, thickened tunica; B, remains of wall of testicle.

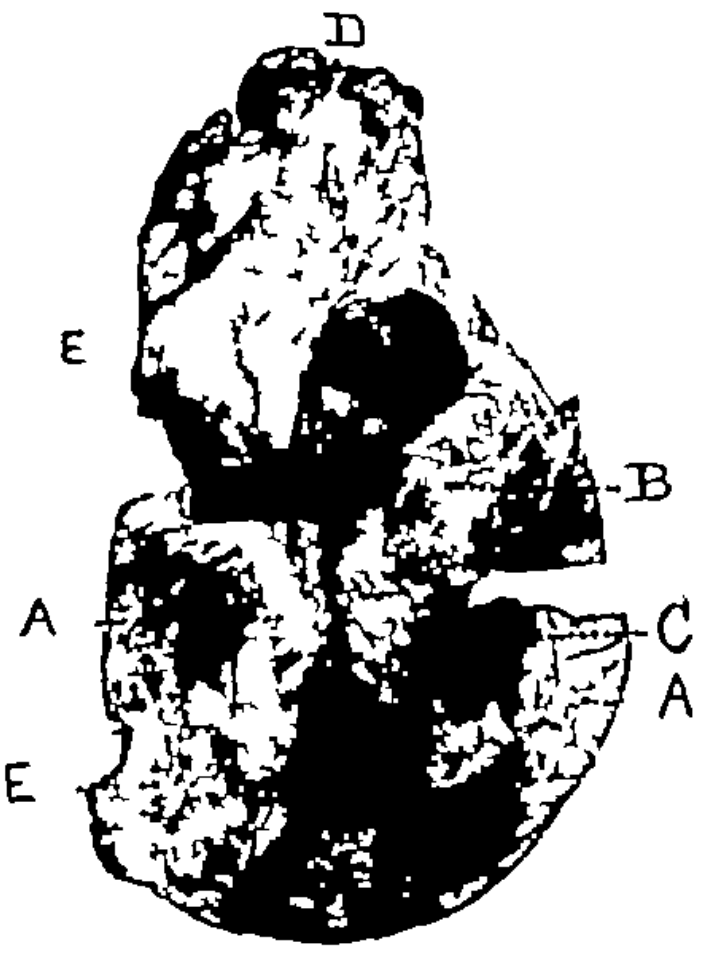


Fig. — Lateral view.

C, abscess cavity in testicle; D, spermatic cord; E, epididymis. Photographs by L. S. Brown.

thus removing en masse the testicle, epididymis and tunica vaginalis (Figs. and). In the cut section the mass appeared to be normal. The inner aspect of the scrotal wall, very necrotic, was then thoroughly curetted and the cavity swabbed with tincture of iodine.

Convalescence was uneventful and the patient left the hospital ten days later.

He came to the out-patient department several times a week for dressings. The wound was entirely healed January 7, 1913. On January 24th he returned with a profuse urethral discharge of about 24 hours duration. There had been no coitus since October. Urination was four or five times day and night, and there was considerable dysuria. The urine was cloudy throughout and contained a few shreds. Smear of the urethral discharge showed much pus and many large gram-positive intracellular cocci. No gram-negative organisms were seen. A culture of this pus showed a profuse growth of gram-positive bacilli and cocci. No gonococci were found. Four days later the urethral discharge and the symptoms had subsided and the urine was perfectly clear and sparkling. It is possible that the organisms found in the abscess and in the subsequent urethral discharge were identical but unfortunately no steps were taken to compare them.

Sections of the testicle at the points shown in the photographs (Figs. and) were examined by Dr. S. B. Wolbach, assistant professor of bacteriology at the Harvard Medical School. We wish here to express our gratitude for his courtesy. His report is as follows:

Section through the wall of an abscess of the testicle including testicular tissue and tunica albuginea (Fig. 3). The border

lining the abscess cavity in the testicle contains a few small masses of necrotic material and in a few places springing from the interstitial tissue, are small areas of granulation tissue The tubules in the abscess wall are flattened and distorted The germinal epithelium shows various stages of atrophy to complete disappearance. The cells of the tubules are represented by thick convoluted bands of hyaline fibrous tissue The interstitial tissue throughout the wall of the abscess shows connective tissue increase and the formation of new capillaries The tubules contain an occasional migrating polymorphonuclear leucocyte The fibrosed interstitial tissue is everywhere infiltrated with polymorphonuclear leucocytes lymphoid and plasma cells The external border of the tunica is very much injected in places there are small hæmorrhages It is infiltrated with polymorphonuclear leucocytes lymphoid and plasma cells At one end of the section involving the tunica and the testicular tissue is an abscess cavity lined with granulation tissue and necrotic material The necrosis has extended irregularly into the substance of the testicle following the interstitial tissue This abscess cavity is apparently at the reflection of the tunica vaginalis upon the testicle There are smaller abscess cavities in the greatly thickened and fibrosed tunica vaginalis

There is nothing distinctive in the pathological process represented by this section The changes are such as might be found in the tissues surrounding an abscess due to any of the pyogenic organisms The process has been extending by way of the interstitial tissue The changes in the tubules are largely due to pressure and subsequent atrophy except where they are totally necrotic through involvement in the abscess cavity

The two following cases were seen by the writer in his own practice

Case 1 H K H 30 years old single Referred by D A J Halpin of Lowell, Massachusetts, February 3 09 for chronic prostatitis

The patient had had gonorrhœa about 7 years previously Six months later the left epididymis became involved Since this he had had prostatic massage irrigations, and sounds regularly every



Fig 3 Microphotograph (3 diameters) of section of abscess AB Upper edge of section shows abscess cavity lower edge shows tunica Photograph by L S Brown

week The urine was clear with a few shreds there was no urethral discharge but there was a little pus in the prostatic secretion The left epididymis was slightly thickened After one or two visits the patient disappeared Two weeks later I was called to see him On the day after his last visit the left side of the scrotum became tender painful, and swollen The condition rapidly grew much worse There was marked constitutional disturbance evidently much fever, and great pain There had been no urethral discharge or urinary symptoms

When seen by me the patient looked very sick and had evidently lost much weight. The left side of the scrotum was much enlarged red indurated, and brawny Anteriorly the tumor was fluctuant The mass was moderately thickened Nothing abnormal was made out in the right side of the scrotum or in the prostate or vesicles No discharge could be milked from the urethra Urine was not seen

The fluctuant area was incised with the escape of about one ounce of thick yellow pus, containing the colon bacillus in pure culture Testicular tissue, necrotic and sloughing, appeared in the wound There were many strong adhesions between the layers of the tunica vaginalis On separating these the epididymis was found to be essentially normal in size and consistency The whole lower half of the testicle was involved in a abscess leaving cavity round which was dense tough yellowish wall The upper half of the testis appeared to be normal in size and consistency and, together with the epididymis, was left behind in the hope of saving it The necrotic tissues were carefully curetted and the wound drained

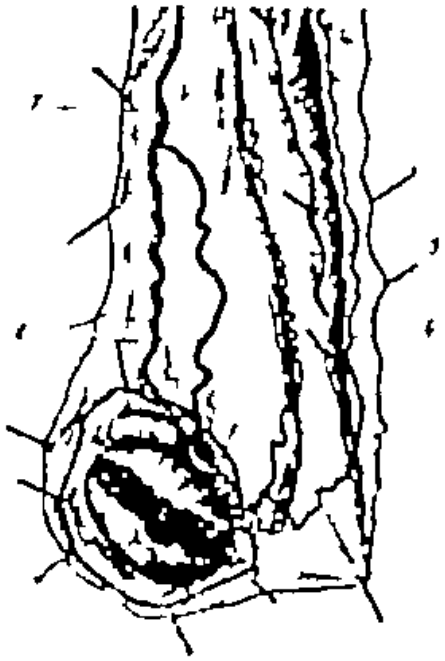


Fig 4 Type spermatic artery epididymal branch of the spermatic 3, deferential artery 4 funicular artery 5, epididymo funiculo-deferential anastomosis in form of T Photographs of Figs 4 5 and 6 by L. S. Brown after Paquet and Worms

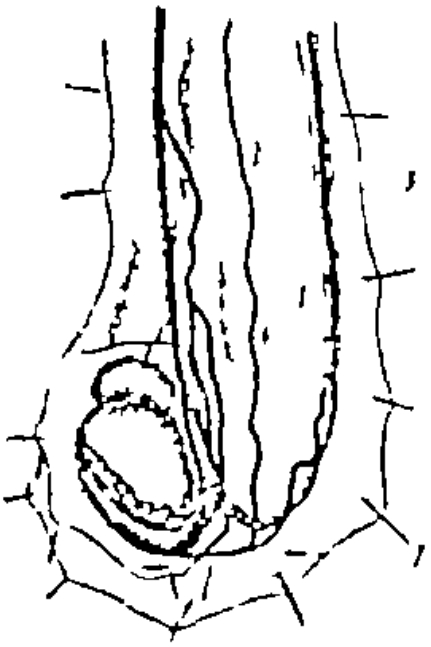


Fig 5 Type spermatic artery (main trunk) internal spermatic artery 3 external spermatic artery 4 epididymal branch 5, deferential artery 6, funicular artery 7 spermato-funiculo-deferential anastomosis in form of T

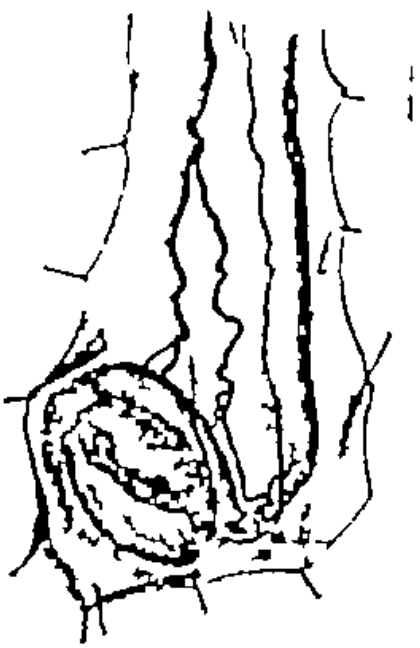


Fig 6 Type 3 spermatic artery epididymal branch of spermatic 3, deferential artery 4, funicular artery, 5 anastomosis between epididymal branch and deferential artery 6, anastomosis between testicular branch of spermatic and funicular artery

Coalescence was uneventful except that during it the upper half of the testicle sloughed out leaving behind an epididymis which, up to date, seems perfectly normal

Case 3 C B 35 years old, single, lawyer Referred to the writer on December 3 1909, by Dr John W Dewis of Boston

Gonorrhea several times, the bilateral epididymitis four years previously About four weeks ago the right side of the scrotum became swollen and painful Patient was confined to his bed for several days on account of pain and tenderness A few days ago an abscess formed in the front of the scrotum causing much pain There has been no discharge from the urethra and no abnormality of micturition

The patient looked ill and haggard The right side of the scrotum was found to be much enlarged very oedematous indurated, and reddened In front, near the raphé, there was a soft fluctuant area The scrotal contents could not be made out The left testis and epididymis were normal

Orchidectomy was performed by the writer The whole spermatic cord was much thickened and matted together but the vas itself was not enlarged Incision of the fluctuant area in the scrotum allowed the escape of much thick pus, mixed with necrotic testicular tissue The tunica was much thickened and adherent to the testicle anteriorly The latter was involved in an abscess which invaded chiefly its upper half The epididymis did not seem to be inflamed Unfortunately no cultures were taken

That the testicle, even in the presence of an actively suppurating epididymis is extremely resistant to bacterial invasion we are all aware Its power to recover from severe infection, as, for example tuberculosis after removal of the primary focus in the epididymis has been shown by the writer in his studies of epididymal tuberculosis. It would seem therefore that Nature had planned well to preserve to the last an organ which is of prime importance not only for her welfare but also for that of its owner

The defense of this vital organ is twofold consisting on the one hand of its dense and intimately applied tunica albuginea on the other of its rich and elaborate blood supply and finally we must regard the rich lymphatic network with which it is surrounded and permeated (Testut and others) as being a protective factor of no little value Also we regard it as possible that the little under

stood but none the less recognized internal secretion of the testicle may contribute more or less to its comparative immunity The value of the albuginea as a protective shield was recognized and described year ago by Gendrin whose opinion was also shared by Curling The latter says

When the contiguous organ or adjacent part is of a different structure from that of the cellular tissue the extension of the inflammation inward is checked. Thus in the case of the inflamed tunica vaginalis the cellular tissue readily transmits the morbid action to the epididymis but the tunica albuginea arrests its progress to the body of the testicle.

The elaborate blood supply already mentioned is to be regarded as a two-edged sword Not only can it maintain such a high state of nutrition in the testicle that incoming bacteria are readily discouraged but obviously it also serves as the high road along which these organisms can travel. This rich vascularity of the organ, a kindly provision of Nature not only for the salvation of the reckless surgeon, but also for the testicle itself has been demonstrated by Picqué and Worms who have perfected and confirmed the work of many earlier investigators in a large series of careful dissections of injected human specimens. They have shown constant but slightly variable anastomoses between the spermatic, the deferential, and the funicular arteries (the latter running in the walls of the tunica vaginalis) These variations fall roughly into three groups (Figs 4 5 and 6) In each, however it is clear that blood is conveyed to the testicle by the three different arteries already mentioned any one or two of which may be and often are destroyed without harm to the organ.

If now we are to regard the rich blood supply of the testicle not only as a means of defense but also as the conveyer of infectious organisms, we may well ask, Why is not the one function of the blood stream nullified by the other? The question is partially answered by the statement of Belfield that the testicle, like the kidney is an excretory organ. He has recently said

"While the kidney is provided with a new and private sewer the ureter the testis continues to use the frog's old urinary duct, now called epididymis and vas deferens. This excretory function of the testicle and its duct illumines both its intimate alliance with the kidney and its frequent infection from the blood The recognition of the testicle as an excretory organ illumines the frequent invasion of its tubules by mumps typhoid and colon bacilli spirocheta pallida, and other blood infection

For our purposes we must go farther and attribute to the testicle not only an excretory but also a selective function In this way only can we explain its freedom from invasion by the gonococcus and to a certain extent, the tubercle bacillus. For these two organisms at least and especially the first, the testicular soil is inimical. On the other hand the testes seem on occasion to offer favorable conditions for the growth of the organisms of typhoid fever mumps glanders, and syphilis. These organisms rarely if ever attack the epididymis, and then only late in the disease Here again is evidence of a selective function

The pyogenic organisms such as the colon bacillus, the bacillus mucosus capsulatus and the staphylococcus aureus find conditions favorable for their growth in testis as well as in epididymis. In this group we can also place the tubercle bacillus for as we are all aware, while it attacks the epididymis primarily it may later invade the testicle, flourish there in a half hearted manner and disappear after the removal of the primary focus

It is our conviction that organisms of various types may and do circulate in the blood stream at various times and under certain conditions. To the fact that they find lodgment in certain organs and tissues when circumstances are favorable is due the occupancy of most of the beds in our hospitals

It is clear that these organisms find their way into the testis and epididymis as freely and as frequently as into other organs, perhaps more so owing to the fact that their main blood supply the spermatic arteries

take origin from the aorta which might reasonably be called the distributing center But we have seen (Figs 4 5 and 6) that the circulation of the testicle and epididymis is not only very rich but also is so arranged that organisms passing through any one of the three main arteries have free access to both organs more especially the testicle This being the case we must look to the selective action of each organ already discussed to explain the invasion of testicle by one organism of epididymis by another and of either or both organs by a third Furthermore we must ascribe infection of the epididymis more frequent by far than that of the testicle to a less active resistance this being due perhaps to the difference in the blood supply of the two organs which we have seen exists and also to the comparative poverty of the epididymis in its lymphatic circulation

What evidence have we that the infection of the testicle in the three cases reported occurred not by way of the vas deferens not through the lymphatic but by way of the blood stream

In the first place I showed in 1902 that the testicle could be infected much more easily and frequently by injection of organisms (tubercle bacilli) into the general circulation through the aorta than through the vas deferens even though a condition of stasis was produced by ligature of that structure The more recent work of Walker has confirmed this view Speaking of his experimental production of tuberculosis of the testicle in guinea pigs he says

In those cases in which the animals had received injection into the aorta and were killed within a short time afterward I found in one gland several small capillaries containing tubercle bacilli and in another I observed very young tubercles close to the blood vessels It is presumable from this that the organisms penetrate the walls and form a tubercle in the immediately surrounding tissue

What applies to the tubercle bacillus may apply as well to other organisms. But it must not be forgotten that in clinical material owing to the length of time which generally elapses from onset of disease to time of operation the pathologist is obliged to read the story backward a feat which he is either unwilling or unable to perform

Secondly it is now universally acknowledged that renal tuberculosis occurs not by ascending infection through the ureter from the bladder but by a hæmatogenous or lymphatic route In other words infectious processes tend to follow the natural route of the secretion or excretion of the organ involved Thus it is also acknowledged by most that in genital tuberculosis the epididymis is primarily attacked prostatic involvement being secondary Thus the tubercle bacillus follows the current in the vas deferens from epididymis to prostate Even in the frequent examples of involvement of the second epididymis shortly after the involvement of the first side there is ample experimental and clinical evidence to show that this too is not a deferential but a hæmatogenous or in certain cases a lymphatic transmission of bacilli

Thirdly in many infections of the testicle by the typhoid bacillus as well as in other organisms repeated examination of the urine microscopically and bacteriologically has revealed no bacteria The infection is clearly hæmatogenous although in a few cases mention has been made of the involvement of the whole spermatic cord or of the groin indicating possibly migration of organisms through the lymphatics

And so it must be regarded in our first case if not in the others as well All the diagnostic means at our disposal failed to reveal a focus of infection in the body not even in the genital or urinary tract Although it seems probable that the patient had had an epididymitis and possibly a prostatitis perhaps of gonorrhœal origin The patient had a severe pyorrhœa alveolaris and a reddened pharynx Possibly a culture from these two points would have thrown light on the matter The infection of the testicle in the second case with the colon bacillus is equally obscure and purely matter of speculation But in both it seems clear that the infection was hæmatogenous although we cannot exclude a lymphatic origin

This view is strengthened in the first case at least by the report of the pathologist who finds the process to have extended by way of the interstitial tissue a fact which suggests a blood borne infection The work of Walker seems to bear out this belief

Reduced to its lowest terms this discussion summarizes as follows

1 The testicle is protected from infection by its tunica albuginea on the one hand and by its rich blood and lymph supply on the other

2 Arguing from an embryologic viewpoint the testicle like the kidney may be regarded as an excretory organ

3 As blood borne organisms reach epididymis and testicle with equal freedom and frequency it would appear that the latter has a selective function rejecting certain organisms and harboring others

4 Most of the testicular infections are hæmatogenous A few probably are lymphatic in origin

5 Infection of the testicle resulting in abscess and without epididymal involvement is exceedingly rare

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ELEPHANTIASIS CONGENITALIS LYMPHANGIECTATICA

With the Report of Case from the Service of Dr Besley and a Pathological Report by Harry Jackson M D of the Northwestern University Medical School, Department of Pathology

B FREDERIC A. BESLEY M D Chicago

Associate Professor of Surgery Northwestern University Medical School, Attending Surgeon, Cook County Hospital Attending Surgeon Wesley Hospital

ALTHOUGH in the title of this article I follow the classification of Kaufman it is not my intention to insist upon any essential difference between this condition which I have named as a variety of elephantiasis, and the lymphangiomata. If anything, its frequent situation upon the entire lower extremity its lobulation with cutaneous thickenings and subcutaneous fibrosis, and the general pathological character indicative of vascular stasis and dilatation with subsequent fibrosis rather than of new growth are the considerations in favor of this nomenclature. Nevertheless the distinction between the congenital types of elephantiasis and lymphangiomata (which are usually congenital neoplasms) is little more than one of terminology Hereafter they will be spoken of rather indiscriminately Both present the same hyperplastic elements not only the lymphatic vessels but also the fatty and fibrous tissues, and the smooth musculature of the walls of the larger lymphatics participating in these growths (Ribbert) A variable amount of lymphatic fluid often very abundant, occupies the dilated and tortuous lymph channels, and in addition there may be considerable tissue oedema.

The congenital origin bespeaks a disturbance in embryonic development. Thus these conditions may often be associated with other anomalies, such as myeloceles encephaloceles.

Their size may be complete at birth as in our case given in illustration, small tumefactions may undergo unlimited subsequent enlargement, or neoplasms may develop late from congenital beginnings.

Lymphangiomas may be simple cavernous or cystic, but most forms actually encountered are mixed or transitional in character

Simple lymphangiomas are proliferations of lymphatic vessels and connective tissues, occurring usually upon the face and neck as congenital, flat or somewhat nodular thickenings of the skin and subcutaneous tissues, which are but slightly circumscribed They are related to pigmented nævi lentigines freckles, and flesh warts but these, because of their excessive hyperplasia of endothelial cells are better classified with the endotheliomata (Ziegler)

Cystic lymphangiomata present uni or multilocular cysts, minute in size to that of a child s head These are lined with endothelium and filled with serous fluid. Sites of predilection are the neck, posterior to the sterno-cleido-mastoid about the angle of the jaw and in the supraclavicular fossa less frequently the cheeks, axilla, groin extremities, the anterior surface of the sacrum and in the root of the mesentery They are definitely encapsulated and thus the most favorable type for surgical measures.

It is, however the cavernous lymphangiomas or those forms chiefly cavernous, that principally concern us here as they are practically identical with congenital lymphangiectatic elephantiasis. We give in illustration a case report of an instance of the latter A study of the microphotographs illustrative of this case gives a good example of the dilated lymph spaces, which are characteristic of this type of angioma.

Lymphangioma cavernosum is the most frequent form of the diffuse non-encapsulated lymphangiomas They appear in the cheeks (macromelia) the lips (macrochelia) the tongue (macroglossia) the concha eyelids and mucous membrane of lips and palate — also as lobulated growths of considerable size upon the face, the neck, and the lower extremity (as in our case) and it is to these forms that the term elephantiasis congenitalis lymphangiectatica has been applied



Fig Fig Fig 2

Possibly their appearance and location (when on the leg) have been suggestive of this name It would be of no practical value to enter into theories of etiology such as intra uterine pressure and subsequent stasis being causal rather than neoplastic formation and as before stated the pathological differences are not incessentials

The example given presented mainly the picture of cavernous lymphangioma and if portions vary it is to be remembered that most of these are mixed in form

These tumefactions occur in the skin subcutaneous, and sometimes in the inter muscular tissues Their appearance as in dicated above is variable from the flat smooth, loose swellings in the cheek to the lobulated forms Their boundaries are ill defined The lymph spaces communicate with the legitimate lymphatic channels so that prolonged pressure reduces the size of the tumor and the same is gradually regained later upon its cessation The overlying skin is little, if at all, discolored and cannot be raised from the tumor Pachydermia is more common in the lobulated forms consistency is soft, with an indistinct sense of fluctuation.

Slow growth is usual Rapid increase and decrease in size is common in all forms of lymphangiomas, sometimes due to the occur rence of infection Acute inflammation may result in subsequent cicatrization and shrink age but may lead to dangerous complica tions such as extension along lymphatics or sloughing and exhausting lymph fistulæ Regular growth is however the rule skin and muscles may be infiltrated nerves and blood vessels pushed aside and even bone eroded

Treatment is most satisfactory in the cystic forms which are encapsulated, and may be completely enucleated by blunt dissection removing as much skin as may be required Complete removal is not possible in the simple or cavernous forms. Partial removal of deep wedges is disappointing in result, and there is danger of inflammation and lymph fistula The repeated injection of irritants may cause some diminution in size Cauterization should be discarded also ligation of the blood supply of the part as the latter does no good and may result in gangrene

The following case presented some unique points of interest and is reported for statisti cal purposes

Case No. 33 729 Ronald R was admitted to my service at Wesley Hospital September 191 Th patient, ts year old boy, is normal in every way except for the condition of the right lower extremity The father stated that labor had been normal and that the enlargement of the limb was noted at birth. As nearly as could be ascertained, the rate of growth of the enlargement was proportionat to the growth

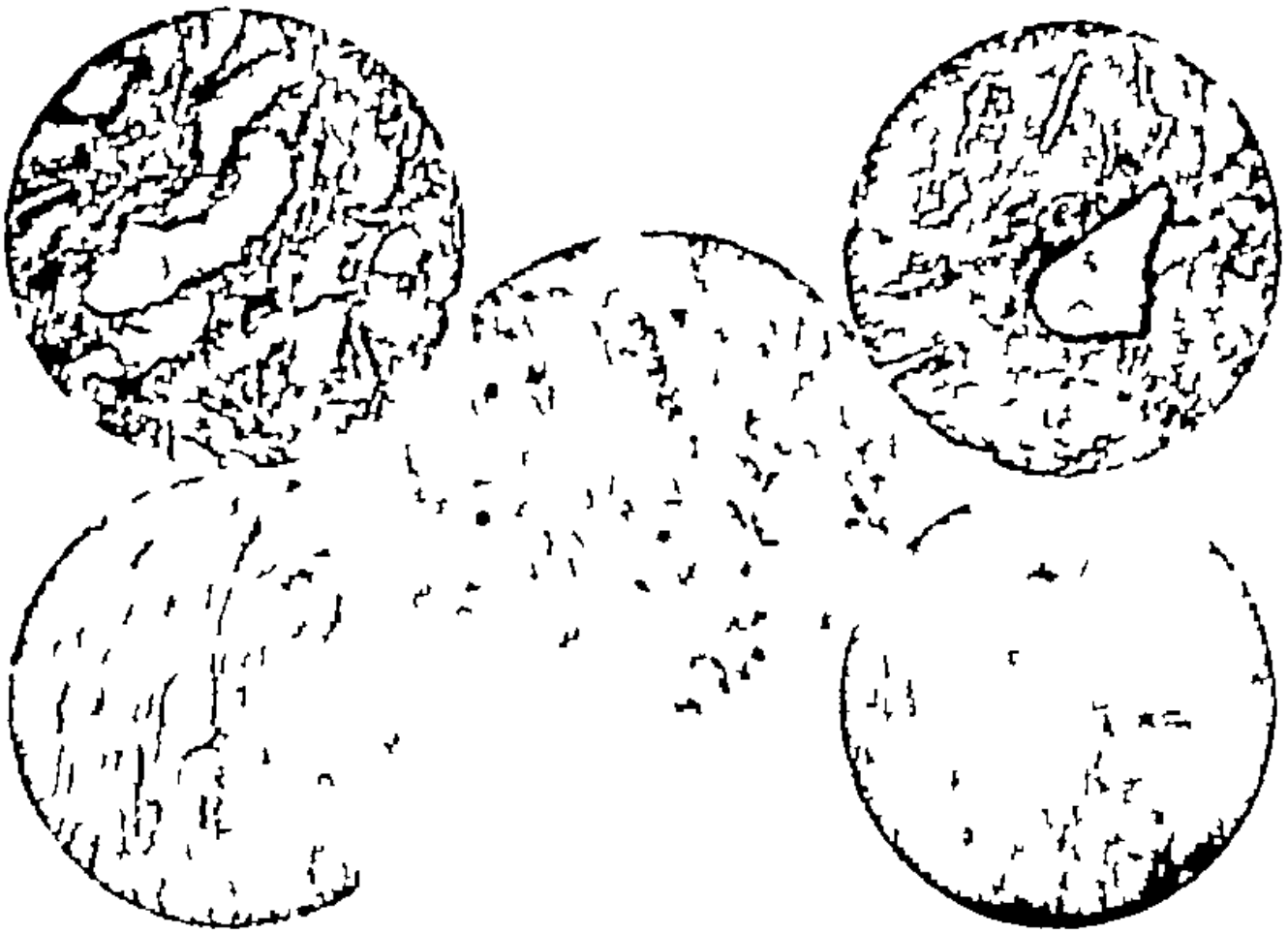


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 1.—High power magnification of an oblique section showing a dilated lymph channel surrounded by dense connective tissue stroma in which are scattered small and plasma cell infiltrations. Fig. 2.—Lymph nodes which can be deeper lying than those in Figure 1. A portion of vessel can be seen showing the meshwork of connective tissue and dilated lymph vessel also. Fig. 3.—Low power magnification of an oblique section showing lymph vessels undergoing changes characteristic of lymphangiectasis. Fig. 4.—Low power magnification of an oblique section of the lymphatic showing thrombus formation.

of the rest of the body and limb. Examination revealed large lobulated tumor masses on the right thigh and posterior part of leg. It was firm, elastic, and attached to the skin, the bone and muscles moving freely on the deep tissues. Figure 1 gives the side of irregular shape, size and position. The limbs were of equal length and size, except for little differences in the child's walk, which was difficult. There was nothing in the family history that had a bearing on the pathogenesis. Radiographs showed the bones of the leg to be unaffected.

The patient was anesthetized and free excision was made on the posterior aspect of the thigh and leg. It was found firmly attached to the skin throughout its entire extent but superficially rather than to the deep fascia. It was possible to remove large parts of the mass and even in the deeper parts the tumor was easily shelled from the skin. There was no evidence of large amounts of serum from the wound for a number of days but it healed without an obstructive apparatus. The patient returned home and died of pneumonia about a month later.

The following is the pathological report made by Dr. Harry J. Corson of the Pathological Department of Northwestern University Medical School.

PATHOLOGICAL REPORT OF A CASE OF ELEPHANTIASIS CONGENITALIS (LYMPHEDEMA HEREDITARIUM) BY DR. HARRY J. CORSON

According to Kaufmann elephantiasis may be classified etiologically as (1) elephantiasis congenitalis and (2) elephantiasis acquisita.

Elephantiasis congenitalis may also be hereditary and usually appears as tumor

like swellings of the skin which are partly fibromas with lymphangiectases, and partly neurofibromas. Elephantiasis acquisita may be of the tropical type which is endemic in tropical countries, and is due to the filaria sanguinis hominis. These organisms block up the lymph channels and appear in the blood stream during sleep.

Elephantiasis nostra is the acquired type usually found with us and occurs after chronic or recurring inflammations of the skin. It has been found after erysipelas, lymphangitis, eczema, tuberculosis and syphilis. With the removal of the lymph gland, for instance of the groin, elephantiasis has been produced in the penis and scrotum.

Location. Elephantiasis is most commonly seen in the lower extremities and in the male and female genitalia. It may occur in the lips and tongue as macrocheilia and macroglossia. It affects the epidermis, cutis and subcutis, with an increase of the connective tissue and a widening of the lymph channels, while the muscle, fat and nerves are destroyed.

Varieties. According to consistency we have:

Elephantiasis dura, a form in which the connective tissue is very dense and gives to the tissues a hard consistency.

Elephantiasis mollis, which has an oedematous connective tissue which is grayish white in color.

A study of the surface allows of the following classification:

Elephantiasis glabra, in which the skin is smooth.

Elephantiasis verrucosa, in which the skin is rough and warty.

Elephantiasis tuberosa. Here the skin is in thick plaques presenting an appearance resembling ichthyosis.

Elephantiasis nigra, with pigmented skin.

Elephantiasis lymphangiectatica, a variety in which the lymphatic spaces are dilated or varicose and from which one can squeeze a milky fluid.

Description of a portion of the excised tissue. Grossly the skin appears thickened and reticulated. From the meshwork a thin milky fluid can be expressed. There is considerable adipose tissue present. Near the skin surface the tissue is dense and the lymphatic spaces are small. Deeper the tissue is loose and soft in consistency, the lymphatic spaces larger and the fluid content greater in amount.

Microscopically, the superficial portion of the section which on gross examination was so dense is seen to be made up of connective tissue bundles undergoing hyaline degeneration. The lymph sinuses, lined by a single layer of endothelial cells, are dilated and irregular in shape and fairly numerous. Some of them contain a granular debris, lymphocytes and some red blood cells. In the connective tissue are accumulations of small round-cells. The blood vessels show passive hyperemia.

In the deeper portion of the section the connective tissue is arranged in a loose meshwork throughout which there is considerable adipose tissue. The lymph channels are widely dilated. Some are compressed and appear long and narrow, while others are irregular and tortuous and show dilatations. A few large round-cells are scattered throughout this tissue, and there is much oedema. In this tissue deeply placed are also seen isolated bundles of muscle fibers.

FREE TRANSPLANTATION OF FASCIA[1]

By EDMOND M VON EBERTS, M D AND W H P HILL, M D Montreal

THE feasibility of transplanting tendon was demonstrated in 1881 by Gluck, who transferred a segment of tendon from one fowl to another without loss of function In 1887 Peyrot transplanted a piece of tendon 4 cm. in length from a dog to a tendon defect in the finger the transplant healed in position and function was partially restored About the same time Monod obtained a perfect functional result by transplanting a rabbit tendon to a defect in the flexor longus pollicis of a human patient. Mainzer in 1902 reported two cases in which union occurred in homotransplants used in the bridging of tendon defects. Following the publication of von Hacker's work upon the autoplastic repair of tendons, however attention was directly chiefly to his method. The experimental work of Martin Kirschner gave renewed impetus to the whole subject of free tendon and fascia transplantation and latterly not only has a considerable amount of confirmatory experimental work been done but the practical application has also been put to the test.

Our work was carried out in the Department of Experimental Medicine at McGill University during the early months of 1913 It consisted in the transplantation of a segment of fascia lata from one dog to an artificially prepared defect in either the tendo Achillis the dura mater or the peritoneum of the same dog Twenty-six operations in all were done, and they are described here in three groups

GROUP I

In the first group of nine experiments a segment of fascia lata was transferred to an artificial defect in the tendo Achillis The technique was as follows The tendo Achillis in one leg was exposed by a lateral incision a retention suture of chromicized catgut inserted, and the segment of tendon included in the suture excised An incision was then made over the iliotibial band and a piece of fascia removed 1 cm. longer than the tendon defect and wide enough to form a cylinder of the same circumference as the excised tendon. This flap was next rapidly transferred and sutured with fine chromicized gut around the tendon stumps, the retention suture being included within the cylinder Finally the tendon sheath was sutured with fine catgut. The muscular surface of the fascia was turned outward as being that surface less likely to form adhesions with the tendon sheath. This method of procedure was followed in seven cases. In the other two, instead of the ends of the stumps being included within the cylinder of fascia, end to-end suture of the graft to the tendon stumps was performed

Results In six of the seven cases done by the first method lengthening was entirely prevented and function was regained wholly or in part, according to the lapse of time between the operation and the destruction of the animal. In the seventh case, as the suture between the fascial graft and the lower stump did not hold, there was slight lengthening but comparatively little loss of function. In the two cases done by the second method the yielding of the sutures led to permanent lengthening of the tendon, and there was, consequently only partial restoration of function

Following the grafting of fascia in such a position, there is at first a marked thickening owing to exudation within the tendon sheath and to proliferative changes in the surrounding tissues. This thickening about the graft subsides gradually and with its subsidence there is a concomitant improvement in function, until finally normal movements are restored. The dog from which specimen No 7 (Fig 1 *b*) was taken was killed 33 days after operation, at which time, although there was still a slight limp the animal was able to stand on its hind legs and jump about without evident pain or discomfort There was no deformity In animal No 24 (Fig 2) killed six and two-thirds months after operation, there was complete restoration of function

Specimens were taken from all the animals in this group except one and each specimen

[1] Read before the Montreal Medico-Chirurgical Society December 1913



( ) (b) ( )

Fig Tendoo defect allowed to heal ithout grafting shos marked lengthening of the tendo achillis, b grafted tendon 33 days after operation shos marked thickening of the tendon moderate grade of muscular tropky Tendon normal in length c, normal tendon



Fig Grafted left and normal right tendon from dog killed six and three fourths months after operation showing normal length of grafted tendon, slight thickening at the site of the graft, and slight muscular atrophy In this case there was complete restoration of function

shows that the graft retained its normal gross and microscopical appearance

The comparison of a tendon in which the defect has not been repaired (Fig 1-a) with one in which it has been repaired by a graft (Fig 1-b) proves at once the value of the graft Undue lengthening and loss of function in the tendon have been prevented A further comparison of the grafted tendon (Fig 1 b) with the normal tendon (Fig 1-c) shows that there is no lengthening whatever

Microscopical preparations from these grafts show unaltered fascial elements that is, fascial fibers or bundles of fibers with unaltered staining reaction of the component cells In grafts removed a few days after operation there is seen, in varying degrees, an inflammatory reaction chiefly evident in the space between the tendon sheath and the transplant, and characterized by the exudation of lymph and the proliferation of connective tissue cells derived from the inner surface of the tendon sheath. There is a similar though less marked inflammatory



Fig 3



Fig 4

Fig 3 Specimen showing dural graft A few adhesions were present at the center of the graft, beneath which at the time of operation, owing to hemorrhage cortical vessel had to be ligated There re, however no adhesions along the line of union of the graft with the dura mater

Fig 4 Fascial graft of the meninges viewed from within the skull Complet absence of adhesions between pia arachnoid and graft

reaction in the tendon sheath itself and in the tissues immediately surrounding it, the whole representing the early inflammatory changes which are responsible for the marked thickening that shortly follows operation and in the final stages, for the permanent thickening that is usually present in a greater or less degree. There are no signs of vascular invasion of the graft nor of multiplication of the fascia cells. On the other hand there is no necrosis. The grafts are apparently kept alive purely by lymph seepage.

GROUP II

In the second group of three experiments, segments of fascia lata were transplanted to artificial defects in the dura mater and sutured into place with silk thread. One of the animals died of œdema of the lungs at the conclusion of the operation. Photographs of specimens from the other two animals are here shown. In one (*Fig. 3*) there are a few adhesions at the center of the graft, beneath which, at the time of operation, a cortical vessel had to be ligated owing to hæmorrhage. There are however no adhesions along the line of union of the graft with the dura mater. In the second specimen (Fig. 4) there is perfect union, and adhesions have not formed *between the pia arachnoid and the graft*. In these cases the muscular surface of the fascia was turned toward the brain. The outer surface of the transplant became adherent to the overlying temporal muscle. Convalescence was uninterrupted. As it was thought more desirable to show the graft in position a microscopical examination of the transplants was not made.

GROUP III

In the third group of 4 experiments, segments of fascia were transplanted to artificially prepared peritoneal defects. The muscular surface of the grafts was turned toward the peritoneal cavity. Although there was no injury to the surface of the grafts and no unnecessary exposure of the tissues to the air, adhesions of varying extent formed in all of these cases between the inner surface of the graft and the great omentum. Preventive measures such as smearing the inner surface of the graft and the suture line with vaseline, flooding the field of operation with saline, packing off the intestinal coils presenting with vaselined silk tampons, and everting the peritoneum and margins of the graft by means of Mayo's stitch all proved without avail. It may be said however that in the dog a suture of the peritoneum in the neighborhood of the median line can rarely if ever be performed without the occurrence of such adhesions. In all of these cases, with the exception of one in which failure of the intratracheal insufflation apparatus caused a break in the technique, the wounds healed by first intention. Microscopical slides prepared from the grafts implanted in the parietal peritoneum show the unaltered state of the fascial elements and the inflammatory changes associated with the adhesion formation between the graft and the omentum.

The success of experimental work upon the *free transplantation of fascia* and *tendon* has led to its practical application in the repair of tendinous and muscular defects and in the closure of hernial orifices where other methods have failed or are likely to fail. It is now generally believed that the lack of success met with formerly in tendon grafting was due to faulty surgical technique and not to the *presence of a detached tissue element*, that is, one without direct vascular connection. The fact that such grafting is now successfully performed speaks volumes for the technique of the modern experimental laboratory.

In the human subject material for transplantation is usually obtained from the fascia lata. After the field to which the graft is to be transferred has been prepared a curved incision with convexity forward is made on the postero-external aspect of the lower third of the thigh and the necessary amount of *fascia stripped from the underlying muscles*. This is then transferred quickly and sutured into position. The raising of the fascial flap should be effected without scoring or other injury to its inner or muscular surface. The muscular surface of the transplant should be turned outward, since under normal conditions this surface glides over the muscles and shows less tendency to form adhesions than does the outer surface — a factor of especial

importance in the repair of tendons. After the main operation is completed, the wound in the thigh is closed with skin sutures. No attempt is made to obliterate the fascial defect, partly because in most cases it is impossible to do so and also because experience has shown that the presence of such a defect is in no way detrimental to the function of the underlying muscles.

Fascial grafts heal without reaction and without appreciable diminution in size, the two requisites being of course, the avoidance of unnecessary mechanical injury to the tissues and the observance of a strictly aseptic technique. Failure owing to infection is naturally more likely to occur in non-aseptic cases, but even in such cases, in which defects in the intestinal canal, the urinary passages, and the trachea, have been repaired, and in one case of ectopia vesicæ in which a large area of the transplanted fascia necessarily remained exposed, prompt healing has occurred.

Since the publication of his experimental work Kirschner has employed extensive fascial transplants in man in 40 cases and has observed its use by others in 10 cases. In every case the transplanted fascia has met the demands made upon it. For the fascial repair of tendon defects Kirschner recommends, in a recent publication the technique employed by us in our experimental work, that is, the inclusion of a considerable portion of both tendon stumps within the ends of the cylinder of fascia and he points out that by this means tension may be avoided and the danger of suture failure very greatly lessened.

Since the appearance of Kirschner's work we have had an opportunity of employing a free fascial transplant in the repair of a defect of the abdominal muscles following appendicectomy The history of the case is as follows.

J. L. L., aged 3 years, was admitted to the Montreal General Hospital on June 2 , 9 on the third day of an attack of acute appendicitis.

Under morphine gr 1/6 and nitrous oxide-oxygen anæsthesia, the usual incision for appendicectomy was made. The internal abdominal oblique was found to be œdematous. An area of the transversalis fascia and the peritoneum 6 cm. vertically by 3 cm. transversely was entirely necrotic, and immediately beneath these necrotic layers, lying in an abscess cavity was a perforated gangrenous appendix. The appendix was removed and a drainage tube inserted. The two outer muscular layers were brought together with interrupted catgut sutures, and interrupted silkworm-gut sutures were placed in the skin. On the eleventh day after operation, as there was complete obstruction of the bowel, an incision was made in the median line and a large pelvic abscess was evacuated. A second abscess was evacuated by digital exploration through the original appendicectomy wound. From this time convalescence was uninterrupted.

On February 2 19 2 the patient returned for the removal of the scar and the repair of the original appendicectomy wound. Under morphine gr ¼ and nitrous oxide-oxygen anæsthesia the scar tissue was excised, and the edges of the external and internal abdominal oblique muscles in the path of the scar were freshened and retracted, exposing a wide defect in the transversalis fascia. A flap of fascia 4 by 6 cm. in area was then removed from the anterior surface of the right rectus abdominalis muscle and sutured with fine chromicized gut into this defect. The internal and external abdominal oblique muscles were next sutured with interrupted catgut over this fascial flap, the whole forming a firm, resistant covering to the peritoneal and transversalis defect. The wound healed without reaction and the patient has since been free from any sense of weakness in the abdominal parietes.

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A SUMMING UP OF THE GOITER QUESTION[1]

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CONCERNING the development of the thyroid, embryologists have returned to their former belief that the gland is developed from a single instead of three anlage. It originates between the three portions of the developing tongue and early descends to its final resting place upon the trachea. The tubular line of descent is known as the thyroglossal duct and early undergoes obliteration. The remains of this structure often persist at the posterior portion of the tongue the foramen cæcum. Gaskell has shown, however that in the higher invertebrates the duct persists as such and in great part delivers into the genital tract, the analog of the thyroid thus being evidently a sex gland. Occasionally the gland remains in the tongue as a lingual thyroid again, portions are separated in descent as aberrant thyroids, or partially attached as accessory thyroids, while the midline cysts are usually due to the persistence of pharyngeal embryonic mucosa carried down in the thyroglossal duct by the descending gland.

The gland, horseshoe in shape and consisting of two lobes connected by an isthmus, rests astride the trachea, to which it is quite firmly attached by its capsule No other organ in the human body is so well provided with a blood supply In proportion to its weight it receives *28 times as much blood as* the head, and all the blood in the body passes through it, as it does through the brain once every hour It has been shown to be five and a half times more vascular than the kidney While the lymphatics are numerous, those leaving the gland are small as compared with its wonderful blood supply apparent activity and production of secretion. It is probable, however that this secretion is delivered into the veins by short lymph spaces throughout the gland itself. Baumann showed long ago that there was a high iodine content in the human thyroid. There is much less in herbivorous animals. Marine has done much work on the iodine content of the thyroid in warm-blooded animals and fish. Hunt and Smith have carried on biochemic tests for the same substance.

The secretion of the thyroid is thin, watery and non-stainable, and it is probable that the active cells represented by one-sixth of the gland are sufficient to furnish the necessary amount of secretion for the preservation of good health.

As has been stated the gland in the higher invertebrates is apparently a sex organ. To some extent this relationship holds through vertebrates, *including man. At the period* of puberty some increase in the size of the gland is quite common. This is often noted during menstruation, and especially during pregnancy while at the menopause many of the symptoms are apparently those of alternate hyper and hypoactivity of the thyroid, as shown by its effect upon the nervous and circulatory systems and nutrition. While it is probably as active in the control of early growth, both mental and physical, as is the thymus, a child born without a thyroid fails to develop mentally or physically and its loss in the adult usually leads to a peculiar deterioration known as myxœdema.

The variations in the gland without symptoms are so great that it is almost impossible to state what is normal thyroid. Undoubtedly the gland has a considerable storage function, *and when this is carried to excess* it leads to local areas of stasis due to pressure atrophy of the producing cells. Such glands constitute many of the atoxic (simple) goiters, though here also are included some of the encapsulated adenomata of both adult and fœtal type. Colloid, then, may not be an essential secretion, but a spongy holding material thrown out by the gland in exerting its storage function.

In exophthalmic goiter — so-called hyperthyroidism — there is always a true hypertrophy and hyperplasia, an increase in the cells and activity of the gland. Atoxic (simple) goiter includes about all varieties not inflammatory exophthalmic or malignant, yet in this group have been included a large

[1] Read before the Clinical Congress of Surgeons of North America, Chicago, November 14, 1917.

number of cases of toxic thyroid due to degeneration of the gland and presenting many of the symptoms of exophthalmic goiter particularly those of the cardiovascular systems but always without protruding eyes. These cases, in Europe are frequently classed as pseudo-exophthalmic goiter

In simple goiter there is the enlargement of the thyroid, which may follow its normal contour or occur in the isthmus or either lobe and present the colloid type. It may also be an encapsulated adenoma representing a rounded tumor of the whole gland or any portion of it. The sudden appearance of a tumor of the thyroid with symptoms of pressure may come from internal hæmorrhage or from active hyperæmia, while infections with severe, acute symptoms of toxæmia are but rarely seen.

Substernal goiter is noted in about one in forty cases of simple goiter slight substernal projections occur much more frequently They are diagnosed by symptoms of respiratory pressure, prominent veins extending from the neck down onto the chest, by percussion and by the rontgenogram The very large ones are fortunately of the encapsulated adenoma type, admitting of enucleation.

Simple goiters are subject to changes of the cystic type, especially the encapsulated adenomata, while fibrous and calcareous degenerations are seen, and some cases present all varieties.

Exophthalmic goiter presents a fairly sharp clinical picture. Its onset, as a rule, is relatively acute and the course of the disease fairly definite. Early in the history the clinical picture is that of a toxin acting directly on the more vital organs, more notably the central nervous and vascular systems. Later it is made more complex by the interaction of those organs whose functions have been directly disturbed by the toxin The order of onset of the more important symptoms based on the average of our series is as follows (1) cerebral stimulation (2) vasomotor disturbances of the skin, (3) tremor (4) mental irritability (5) tachycardia, (6) loss of weight (7) cardiac insufficiency (8) exophthalmos, (9) diarrhœa, (10) vomiting, (11) mental depression, (12) jaundice, and (13) death. In some cases certain of the symptoms may not be present in the early stages of the disease, which makes the condition difficult to diagnose. There are certain conditions of the nervous system of unknown origin, which much resemble this disease. As a rule, however these patients have symptoms extending over many months. They have neither exophthalmos nor an increase in the size or density of the gland, and are not benefited by operation on the gland.

In carcinoma and sarcoma of the thyroid the picture is usually one of rapid growth of the gland, which becomes hard and irregular often with neighboring glandular involvement. These symptoms may also occur in a simple goiter of long standing however Because of lymphatic and venous delivery with the early capillary involvement, early metastases in glands and lungs are common and local recurrence is the rule. In such cases, when the disease is confined within the capsule, treatment requires removal of the entire gland.

Because of their interrelationship in function and location, the parathyroids and the thymus are considered in relation to the diseases and especially to the surgery of the thyroid. The parathyroids are usually four in number a superior pair and an inferior pair They are situated on each side and behind the thyroid, but intimately connected with its capsule. Much is attributed to the action of these little bodies in maintaining the equilibrium of the mineral salts of the body especially of the calcium. Experimental evidence shows that, when removed from animals, a condition of muscular spasm known as tetany develops, following a rapid loss of the mineral salts. The blood supply consists of terminal branches from the vascular anastomosis between the inferior and superior thyroid arteries. Their veins have no valves. Thus they frequently become injured by hæmorrhage during the congestion occurring at birth, to which is attributed infantile tetany and also tetanic attacks of later childhood and even of adult life. Tetany following operation is apparently associated with their removal or an injury to their blood supply

associated with a great loss of thyroid tissue. In such cases the best treatment is the feeding of fresh beef parathyroids, and, following MacCallum's plan the restoration of calcium to the body preferably through the administration of calcium lactate in 5 per cent solution, at repeated intervals. In addition to this, the feeding of thyroid is indicated, and some cases are reported as benefited by the parathyroid serum

The thymus is believed by some physiologists to be a gland of marked interrelationship with the thyroid in the growth of the body and in the hyperplasia of the thyroid the thymus is usually found enlarged. While this is true of the majority of cases, it by no means holds good in many of the most serious cases, as shown at autopsy following both medical and surgical deaths of these individuals.

The thyroid consists of a great number of groups of cells which may be found even in the adult in various stages of development, from unarranged embryonic cells, Wolfler's rests, to well-developed follicles lined with epithelium, secreting into a well-marked central cavity The simplest change is hyperemia, which may be temporary occurring through the nervous system or more prolonged through systemic infection. It may be sufficient, however to produce hemorrhage within the gland.

Acute inflammation of the thyroid may occur as the result of traumatism or general bacterial disease. Progressive hyperplasia consists in an increase in the number of parenchymatous cells, usually of a hypertrophic type, either in single or multiple layers. This may occur in parts of the gland or throughout all of it. True adenomata of the thyroid can be identified only when encapsulated. Histologically they are either foetal adenomata, the parenchyma of the true foetal type, or adult adenomata in which the parenchyma has taken on adult characteristics, i.e. follicles lined with cells of adult type and subject to all the changes which are noted in the thyroid outside of encapsulated tumors, that is, the various degenerations.

Of the retrogressive changes, retention of secretion is the more common, the simpler and the more nearly normal physiologic state, as the thyroid is not only an actively secreting organ, but normally has a storage function. Colloid appears to be the basis for the preservation of this secretion. When it occurs in excess, the condition is pathologic and leads to degeneration or atrophy of cells.

Atrophy of the thyroid results from overwork, pressure, and lack of nutrition to the gland. Simple goiter may undergo such a degeneration from these causes and in the production of toxic materials so affect the circulatory and nervous systems that the condition resembles the more severe toxic state of exophthalmic goiter or in fact any chronic toxemia.

To a variable degree thyroid enlargement may be due to demands made upon its secretion by certain systemic conditions, such as sexual development at puberty the goiter of adolescence, the enlargement or hyperemia at menstruation enlargement in the latter part of pregnancy the changes at the menopause, and last, but not least, the possible iodine demand occasioned by bacterial infection of various organs.

Accumulated evidence shows that endemic goiter frequently comes from a water-borne irritant. In such cases ensuing chronic intestinal toxemia may occasion the extra demand on the thyroid. McCarrison in his investigations of the subject in India, has done much to prove this

The various types of goiter should be treated both medically and surgically Many goiters of the simple and mild exophthalmic type undoubtedly recur spontaneously although various forms of medical treatment may hasten the recovery and restoration of the gland to an apparently normal condition in many instances, especially in the early stages of simple goiter

Simple colloid goiter which has resisted treatment and encapsulated adenomata are in most instances best treated by removal of the diseased portion of the gland with preservation of its better portions. If the diseased part is not removed, such glands will later in life expose the individual to a serious menace, since the degeneration which follows in an average time of about fourteen years may be of such a character as to permanently damage

the heart, kidneys and liver During middle life such degeneration frequently follows the *ill-advised use of iodine the severity of the* toxic process places these patients on a par with the severe types of exophthalmic goiter Plummer has shown a great similarity in the damage to the essential organs of the body such as the heart, kidney and liver by various forms of toxemia. In exophthalmic goiter however the essential condition identifying it from all other toxemias is the parenchymatous increase of the thyroid. Exophthalmos occurs in no other systemic condition. The staring eye (Stellwag) and the widening of the palpebral fissure (Dalrymple) may occur with other toxic myocardial lesions, especially that of advanced Bright s disease. Exophthalmic goiter is essentially a disease of a chronic character presenting exacerbations and ameliorations of symptoms extending over a period of months or several years. After the first year the gland often undergoes a regression

While this disease is amenable to surgical treatment by the removal of a large amount of the hypersecreting gland, it is by no means emergent surgery and all patients, during periods of exacerbation, should be considered as medical cases Surgery is indicated in the up-wave of improvement The majority of these patients can withstand thyroidectomy at the time they are seen by the surgeon Extreme conditions especially dilatation of the heart, may require medical preparation, and the operative interference following in cases resistant to treatment should be confined to injections of boiling water into the gland after Porter's plan to hasten improvement. In most of the severe cases a ligation is made, first, of the left upper pole only Should the reaction following this be severe the ligation of the right upper pole is indicated a week later and thyroidectomy reserved until four months have elapsed by which time these patients have made an average gain of 22 pounds with great general improvement However if the reaction following the left ligation is not unduly severe a partial thyroidectomy may be made at the second operation the week following

In operating, the best exposure of the thyroid is obtained by a curved transverse incision through skin and platysma, extending between the anterior jugular veins with wide separation of the flaps, midline vertical division of the muscles exposing the thyroid If division of the muscle be necessary it should be made at the upper part of the dissection to break the line of scar and preserve muscle-function. In some cases the wound may be closed without drainage, the cavity being filled with salt solution. As a rule, however patients having tubular drainage for 24 hours are more comfortable A subcuticular closure of the wound with catgut, approximating first the platysma muscle, secures an almost imperceptible scar

The anesthetic of choice in most instances is ether Complicated cases, however may be best carried through the operation by the local use of 0 5 per cent novocaine solution with the addition of a little adrenalin. Occasionally the combined use of a local with a general anesthetic is advisable, the local anesthetic, relieving the pain, necessitates less of the general anesthetic to secure sleep

In severe forms of Graves disease the use of 1/200 grain of scopolamine with /6 grain of morphine one hour previous to operation is often a distinct advantage Some patients seem to have an idiosyncrasy to the drug and in such cases the operation must be postponed 24 hours to permit elimination. In all cases in which ether is used as the general anesthetic, 1/200 of a grain of atropine should be given one-half hour before the operation, to maintain a dry trachea and pharynx during the operative procedure.

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A RUBBER TUBE IN THE RECONSTRUCTION OF AN OBLITERATED BILE-DUCT AN HEPATICODUODENOSTOMY

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THE use of a rubber tube to assist in the replacement of a common bile-duct occurred in a young woman of 28 years as the result of cicatricial contraction and obliteration of the common duct following infection and sloughing due to the damaging presence of gall-stones.

At the first operation the gall-bladder was found thickened and inflamed like an inflamed and thickened bowel. It was not large but felt almost as solid as a lobe of the liver It was filled with a septic mucoid material in which there were a number of fair sized stones. The gall bladder was tortuous, with a sharp bulging letter "S curve at the base just before its junction with the cystic duct, with two small stones in the lower pocket beyond the reach of the scoop. The gall-bladder was removed, with a portion of the cystic duct, after it had been tied near the common duct with chromic gut. No stones were felt in the common duct, which was traced to the ampulla of Vater nor in the hepatic ducts. A drainage tube was fastened near the stump with a separate stitch of iodized gut and the abdomen closed in the usual manner

There was a fair amount of pain the first 48 hours. At the end of this period bile began to flow freely and continued to drain in gradually decreasing amounts until it was about stopped the twenty-sixth day after operation The wound had healed by first intention up to the drainage opening, but the patient had had more or less nausea and at times periods of vomiting Her temperature had fluctuated running to near 103 F by the third day after the operation, and stayed as high as this for two days more, when it dropped to 101 and by the fourteenth day to 99° Meantime the discharge had rapidly assumed the character of the normal bile discharge with almost no suggestion of pus, and the stools were light brown. The patient vomited on the twenty second day and did so each day thereafter until the twenty-seventh day when a large amount of thick gray pus was discharged through the drainage wound, with a temperature running only to 100.4 F The patient continued to have nausea for some days and occasionally vomited. The stools were of fair color at several days after the operation, but getting lighter and becoming gray by the fourteenth day after which they varied a little from light brown at the time of the pus discharge to yellow and to gray and back to light brown before she left the hospital In poor condition at the time of the operation, she was gradually reduced to ninety pounds, though she began to feel better soon afterward. The pus discharge was gradually reduced in amount, and finally became thin and an almost clear fluid (sometimes in large amounts. At the end of the eighth week the dressings were suddenly saturated with bile, with the patient up and about and stools running fairly light. The bile flow was abundant, and gradually lessened during the next three weeks, when the sinus closed and stayed closed.

The patient went to the country and gradually picked up until she considered herself better than she had been for many months, though her strength had not fully returned. About four months after leaving the hospital, a slight jaundice began to show for the first time, and she felt listless and below tone. The jaundice slowly increased over months of time until at about two years from her operation she had the bronzed color of a Mongolian. She suffered from intense and persistent itching, and the stools were of clay color As this condition had not improved under medical care, a second operation was determined upon to investigate and see if anything could be done to better her condition

Five months ago this was done The omentum was found turned upward over the transverse colon, the stomach, and duodenum,

and filling the deep cavity from which the gall-bladder had been excavated. This was loosened and while the bowels in the general abdominal cavity were found free from adhesions, the tissues in the region of the gall bladder and bile-ducts were adherent everywhere and all landmarks were obliterated

Only those who have been similarly situated can realize what a formidable condition this was to untangle, especially in the absence of the gall bladder The under surface of the liver was fastened by a mass of adhesions to the omentum, the duodenum, the stomach, and the gastrohepatic ligament The foramen of Winslow was obliterated and all tissues were fastened by rather dense adhesions wherever they came in contact with each other Profuse hæmorrhage welled up from a vein in the region of the gastrohepatic ligament, and it seemed that the portal vein had been opened With great difficulty this vein was finally traced up to the stomach and was ligated much to our relief No common bile-duct was found. A small nipple like prominence was finally uncovered in the region of the hepatic duct, which looked like a bulging portion of the portal vein. This was investigated most carefully and finally opened It proved to be the stump of the common hepatic duct. This gave forth a flow of dark bile and mucus, and issued almost at once into the right and the left hepatic ducts. Nothing could be found of the common bile duct except some indefinite thickening of the fibrous tissue, although the whole region well down behind the duodenum was carefully examined. The hepatic ducts were dilated to a size larger than a lead pencil A probe and a small gall-stone scoop dropped easily into both of these ducts from the nipple like stump which we had opened, but there was no sign of a dimple or an opening into the common duct. This had been obliterated, apparently as a result of the inflammatory process of two years before Two stones were recovered from the left hepatic duct, one small, smooth and dark the other a soft stone mass which could be molded with the fingers

By this time the patient, who had not been in very good condition before the operation, was showing rather marked symptoms of shock and it seemed necessary to close the operation as rapidly as possible. The writer decided to substitute a 3/16-inch rubber tube for the common duct. A length of 1¾-inch was taken and passed through a small incision in the convex surface of the duodenum after the end had been beveled to prevent the swelling of the duodenal mucous membrane from occluding the opening and after a linen stitch for security had been passed through the tube, both ends of which had been passed through the small incision in the duodenum and out through all the coats of the bowel lower down, to be tied later and fasten the tube with its beveled opening toward the bowel lumen. This linen stitch was to serve the purpose, also, of retaining the tube in place until the process of healing was well advanced, and so give the mucous lining of the duodenum and that of the stump of the hepatic duct time to grow toward each other and so have the process of lining the new tissues which were going to make up the artificial duct well started before the tube could loosen and slip down into the bowel and be passed out of the body

In order to make something of a papilla to act as a valve and prevent the irritating and infective backflow into the bile-ducts from the duodenum at its periods of increased intra intestinal pressure during peristalsis, three circular stitches were taken in the duodenum about the rubber tube at different distances, as in the Kader Senn operation for gastrostomy making the tube lie in the inverted funnel of the external duodenal wall. The tube was properly turned and the security stitch in its end was now tied.

The opposite end of the tube was inserted into the opening in the stump of the hepatic duct, which was made rather larger than the tube to allow a fairly free drainage of the diseased bile past it and on out of the abdominal drainage wound. The tube fitted into the dilated hepatic duct loosely and would easily permit this drainage. Two mass stitches of celluloid linen were now taken, one on either side of the tube, into the tough scar tissue of the hepatic stump and through the tissues of the duodenum, drawing these

structures firmly into place but leaving a small portion of the circumference open for drainage. A rubber drainage tube was inserted through the abdominal incision down to the region to be drained but not in contact with the tissues sutured in order that it might not interfere with the healing in any way.

The patient was in a precarious condition after operation but finally pulled through a siege of double bronchopneumonia, from which it seemed for a time that we might lose her. Bile flow into the dressings was abundant from the first and the stools continued of light yellow color for about a week, when they became darker in color. They fluctuated back and forth before they settled down to a normal color and the amount of bile passed also fluctuated from time to time, being more abundant, as a rule, when the stools were lighter in color. The amount of bile drainage stopped down markedly on the eighth day and was passed in varying amounts for a week more, when it ceased.

When the tube passed on into the duodenum is not definitely known. All stools were ordered searched but this was not always done. Our patient was in a low state of vitality and a sluggish inflammation showed up in the fat layer along on the seventh and eighth days. After this had been healed for some time, a small rounded mass slowly developed deep in the abdomen. This was opened under local anesthesia, and proved to be an abscess between the omentum and the inner side of the ascending colon, deep in the abdomen. This was of such low virulence that the discharge was practically gone in three days.

The convalescence was slow but the patient now (five months after the operation) has gained steadily from a weight of 94 pounds to 127 pounds and feels better than she has for three years. She has slowly lost her deep jaundice until the whites of her eyes are clear, the skin has lost its bronze and the intolerable itching is gone. She is proud of the muscle she has developed in her arms.

It would seem that this method might have some value in some of these difficult cases of reconstruction of the bile ducts. The rubber tube allows the construction of a papilla in the duodenum, which may very well be flattened down and closed by the intra intestinal pressure during the peristaltic contraction and open again for the passage of bile during the period of relaxation. This would tend to prevent the dilatation of the bile ducts by the back pressure from the duodenum, which has been shown by Coffey and others to take place in experimental work on dogs when a direct anastomosis is made between the open end of a duct and the duodenum. The dilatation in some has been enormous. In one experiment the bile duct was almost as large as the duodenum and almost as thick. If infection and cholangeitis from the backflow of the bowel contents can be prevented in this way it will be a strong point in favor of the method.

In the next place, even when the duodenum can be brought up to the level of the stump of the common duct, or even of the hepatic duct, the rubber tube simplifies the operation, for the operation of anastomosis by suture alone, with delicate tissues in the stump to work with, at the bottom of the deep and narrow slit between the liver and the surrounding structures, is always a difficult one, if not at times almost impossible. When the distance from the stump of the duct to the duodenum does not allow a safe approximation, the rubber tube allows the surrounding tissues to be drawn about it to form a new tube or it may be covered with an omental graft, as was suggested by Sullivan after he had used the end of the omentum turned up over the transverse colon for this purpose in his experimental work on dogs or other tissue transplants might be used such as peritoneum, superficial fascia or fascia lata.

Dr George E. Brewer of New York attempted the reconstruction of a bile duct in a patient who had lost most of the common duct from suppuration and gangrene following a removal of the gall-bladder. He followed the suggestion of Sullivan, and after fastening one end of a rubber tube to the interior of the hepatic stump and inserting

Coffey, Ann. Surg. Phila., 1909, p. 1158.
Brewer, Surg. Gynec. Obst., 1912, xv, 61.

the other end into the duodenum through a small incision, he wrapped the intervening portion with an omental graft. But he did not construct a papilla nor an oblique passage into the duodenum. This patient died some time later from what seems to me to have been the result of an ascending infection, and not from occlusion (the reason Brewer gives) for her death came on rather rapidly in an acute attack of distress which followed at some interval two similar attacks from which she had recovered spontaneously

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CONSERVATIVE SURGERY OF THE TESTICLE

By GRANVILLE MacGOWAN M.D Los Angeles

IN the quarter of a century or more in which I have been actively engaged in the practice of medicine and surgery I have witnessed a very great deal of careless and wanton surgical destruction of the essential sexual organs, both of men and women. It is but a few years since it was very dangerous for a woman to complain of any pain in the pelvis or of any semi hysterical nervous crisis to her family physician or to her surgical consultant. The ovaries were regarded as the prima facie origin of all obscure disturbances of nutrition, intellect, or temperament, and the idea prevailed that by the removal of these organs the re-establishment of physical and mental balance was certain to occur I have many times stood by the operating table and watched the removal of ovaries that looked to me as normal as it is possible for any organ to be whose periodically recurring functional work monthly contributes to its anatomical deterioration It seemed to me that such operations, anticipating by years the coming of the menopause, were a social cruelty and unwise surgery

Fortunately this method is no longer fashionable, it having almost disappeared from the practice of surgeons of standing the myriads of little cutters, who imitate like monkeys, now seek to conserve organs which they formerly hastened to annihilate

The practice of castration of men has never been an extensive one for the reason that the male almost invariably looks with disfavor upon any operative procedure that robs him of that functional capacity which he values most highly The consent of women is much more easily obtained to castration than that of men for obvious reasons. A man knows that if he is deprived of his testicles he will become impotent, and he fears also that his appearance will change in such a manner that his misfortune will be evident to others, but nevertheless, inspired by fear he will consent to such a mutilation when he believes that the sacrifice will prevent the spread of a dreaded disease or save his life.

So it occurs frequently that testicles are removed when they might very well be saved by the exercise of a patience skill, surgical ingenuity and anatomical knowledge that a very large number of persons doing surgery do not possess. Without the testicles, and an unobstructed pathway for the spermatozoa from the testicle to the penis there is no possibility for a man to become a father In the absence of the testicle or in the presence of a distinct degeneration of its glandular tissue, the sexual function, in all cases, becomes weakened and, in most cases, is entirely lost after a very few years but it is difficult to say always how much of the secretory structure may be destroyed and yet sexual capacity and potency be preserved.

There are certain diseases of the testicle as malignant growths, which require the speedy removal of the organ in order to save the life of the individual. These conditions cannot always be recognized by even the most skillful diagnostician until he has explored the organ But where the patholog

President's Address American Urological Association, Boston, April 26 1913.

ical condition is not clearly defined, and there is a possibility of a mistake in diagnosis by which, in case the organ is not removed the patient may lose his life, it is best always to sacrifice it, with his consent, and then only if but one of the testicles is involved and the other is healthy

There are however two diseases of frequent occurrence which, with the exception of very rare cases, do not call for castration, and in which it should never be exercised without an effort, or repeated efforts having been made to save the organ by conservative surgical treatment and by medical measures. I refer to tuberculosis and to syphilis. Where one or both testicles is the seat of pathological change that has not followed a traumatism, in which the testicle, or a portion of it, is indurated and painless, it should always be suspected that such a growth, whether it has been rapid or slow is luetic and we are not justified in removing the organ until we have fully tried out all of the modern methods for the treatment of syphilis.

Such growths often occur in young men very suddenly without any distinct history of syphilitic infection. The world is full of people who have acquired syphilis in an extragenital way and are entirely ignorant of their affliction. *They are unable to give* any history of a primary lesion. Ignorant, untrained, and unobserving, they may or may not have had distinct skin or mucous membrane lesions, but they cannot tell you—they do not know It is perfectly possible that a young man may develop gummata in both testicles and in both epididymi without having contracted syphilis at all he may be the victim of an hereditary lues which has developed very late It is true that in late hereditary syphilis a careful search will in most instances, show one or more of its stigmata—*there will be, perhaps,* faint cicatrices of corneal ulcers long since forgotten or perhaps never known of by the subject Irregularities in the dental arch imperfections of the sense of hearing deformities or deficiencies of the osseous framework dating from early childhood or definite lesions of the joints pointing to the probability of the existence of hereditary syphilis. If there is a number of children in the family or if the elders are alive, observing, and truthful, a history of parental syphilis can usually be elicited by the marriage history and confrontation. Yet gummatous lesions may exist in the testicles of boys between 18 and 25 with a very faint or no history of heredity and they are very difficult to distinguish from malignant tumors.

No testicle should be removed from such a patient until he has been subjected to the modern blood tests for syphilis, to the vigorous use of intramuscular injections of salicylate of mercury or gray oil, and to the intravenous injections of salvarsan or neosalvarsan, together with the administration of ascending doses of iodide of potassium. The treatment should be the same whether a history of syphilis is clear and direct or only surmised or suspected. Whether the disease is acquired or inherited it is not very likely that gummatous degeneration of the testicle will exist alone yet it is entirely possible that, at least at the time of the primary observation, such a thing may occur I am sure that I have seen it. It is very seldom that syphilitic testicles do not clear up under a thorough antisyphilitic medication yet sometimes they do not, because the blood-vessel supply and lymph-channels are blocked by the pressure of thick walled hydroceles of the tunica or adhesions. In such a case, recourse must be had to conservative surgical measures. In this connection, I will report a case.

About fifteen years ago, a very successful young New York publisher 30 years of age, applied to me for the treatment of his lues He had multiple tertiary lesions These consisted of serpiginous ulcers upon the back, chest, and both thighs, a scaly palmar syphilide, gummatous nodes upon both tibiæ, the sternum, the soft palate, and in both testicles associated with this were an intense cachexia, profound anemia, and a slowly progressing dementia This man knew the nature of his disease he had been sent to California t hide from his friends and relatives, and had been referred t me for treatment The testicular tumor on each side was firmly adherent to the tensely stretched skin, and probably was ten times the size of an ordinary testicle, hard and indurated like ivory but at the upper portion of each it seemed to me I could detect at times slight fluctuation

The mental habit of this individual was such that

he paid very little attention to his skin and his bones and to the threatened perforation of his palate his whole mental concern seemed concentrated upon the probable loss of his testicles and I could only get him to consent to systematic treatment by continuously keeping before him the fact that his disease would, if not vigorously opposed, in all probability unsex him He was given daily injections of one-seventh grain of bichloride of mercury deep into the muscular tissues of the back. This old-fashioned treatment, while it is very effectual, is extremely painful at times, so that I had great difficulty in keeping him to it. Iodide of potassium was given in ascending doses until he was eventually taking 40 gm per day All of the skin and bone lesions cleared up in a month. The mental symptoms, which were more those of endarteritis than actual luetic degeneration of brain tissue also rapidly improved, so that his mental powers returned to practically their full vigor but the syphilitic infiltration of the testicles was not in any way affected by the treatment — neither became softer and neither became smaller He was very much depressed by this incident, and one day suggested to me that I explore one of the testicles and find out whether there was any chance of it ever becoming useful. He thought perhaps, that if the tension were relieved the medical measures might have a better opportunity to become successful.

The normal cellular tissue which one finds between the dartos and the tunica had been changed into a thick, fibrous mass. On the right side the tunica vaginalis, at its lower and middle portion, had adhered to the testicle and had become obliterated entirely at the upper part it had formed a dense sac, enough of the sera being left to make a hydrocele partially enveloping the cord. It contained about 30 ccm. of fluid, and was under very high pressure being kept tense by the thick sac on the outside and by the gummas in the epididymis and the testicle on the inside This was laid open freely and the remains of the tunica dissected away and the hard fibrous adhesions between the sac and the testicle below were broken up by blunt dissection A much smaller hydrocele was found in a similar position in the left testicle More of the tunica was obliterated on this side, and the adhesions were closer between the fibrocellular envelope and the testicle these also were broken up and dissected out The testicle on the left side was smaller and not so tense Softening had not taken place in the gummata in either testicle. The skin and the remains of the sac on both sides were stitched together and the cavities packed with iodoform gauze We then continued the treatments with the sublimat and iodide. Within a few hours after the removal of the tension the condition of the testicle commenced to improve, and inside of two weeks the gummata had completely disappeared and the testicles were restored to the consistency of normal glands

This gentleman remained under my care for a year and at the end of that period he seemed to be entirely well, judged by the standards which we then had for ascertaining the success of our treatment. I instructed him to continue the use of mercury by the mouth, under the guidance of a New York physician for four years. In the interval I frequently heard from him, and during that period of time he had no recurrence of any symptoms which his physician could detect as syphilitic. At the end of five years he married and two years later I received a photograph of himself and his wife and a very healthy looking boy baby

The remarkable thing about this case is the fact that the treatment made no impression whatever upon the gummatous degeneration of the testicles until the tension was relieved by the opening of the deep-lying hydrocele and the loosening up of the adhesions between the testicles and the obliterated portion of the tunica. Since that time I have repeated this experience twice, though in neither instance was the individual so profoundly poisoned constitutionally as in the case reported but in both of them there was no response to the mercury or iodide until the tension was relieved. This is what I term conservative surgery applied to syphilitic testicles. If that could be obtained before the advent of the powerful remedy of Ehrlich, how much more readily could it be accomplished now

TUBERCULOUS TESTICLES

All over the world, every day surgeons are removing testicles for tuberculosis. There was a time when I did it. I sometimes now resort to castration in these cases but only under one of two conditions. The first is when the disease is confined to one testicle, and when after a most careful examination of the mouth and throat, the lungs, the intestinal tract, the prostate bladder kidneys, the skin and the bones, not finding any lesions that can be detected by our modern methods of diagnosis I am satisfied beyond any reasonable doubt that I am dealing with the primary focus of the disease without question without hesitancy

and *without* regret, *I* deprive that individual of his diseased testicle, exactly as I would deprive him of a diseased kidney under similar circumstances. If however I find any tuberculous lesion in any other organ *I* know that I should be practicing unjustifiable surgery in removing that testicle — surgical work which I should condemn if done by myself just as I should condemn it if done by any other person

The other condition is that in which the disease is acute rapid, and explosive when caseous degeneration attacks the secretory structure and it rapidly breaks down, softens and destroys the surrounding tissues, and shows conclusively by its progress that no portion of it can be saved by any conservative measures. Even then it is always with regret that I operate because I have a distinct doubt in my mind as to its efficiency as a probable preventive of a general infection for from experience, I know that in *such cases the vas and the vesicle upon the* same side are already the seat of the disease. Conservative surgery is usually applicable to tuberculous testicles. There is a principle not to be forgotten in these premises tuberculosis is of all the infective diseases, the one that most frequently gets well even under the most adverse circumstances.

The clinical experience which I obtained while working in the post mortem room with Weichselbaum at the hospital *an der Wieden*, when a student, made a deep impression on me. It was a very rare thing for us to find a subject that was not either actively affected with tuberculosis in some one of its organs or showed its healed lesions When, added to this, came the protest of my dead friend Chismore of San Francisco to my removing the testicles from a tuberculous subject in whom he and I were both interested and which mutilation his veto prevented, and I later saw this individual get rid of what seemed to me to be a hopeless tuberculosis infection I changed my views with relation to radical treatment of tuberculosis of the testicles, and became optimistic as to the possibility of the restoration of the functions of these organs, even when they were seemingly beyond possibility of repair This was many years ago and I have lived long enough to add a great many cases to this experience and to be thoroughly convinced that one should be very conservative about this species of surgery

People are cured of tuberculosis of the lungs, and of the bones, and of the skin, and of the organs of the abdominal cavity — why should they not get rid of tuberculosis of the testicles? Even if the conditions are such that one is obliged to do a surgical operation upon such testicles, why should they be removed *in toto*? So long as any portion of the secreting structure of the testicle remains within the body just so long will the function of copulation be preserved to the individual. This is not a matter of indifference. When one has tuberculosis of the testicles, the removal of this organ protects society from the propagation of a race that only keeps up tuberculosis by its weakness.

But I will direct your attention to the fact that we are not acting for the race. Our services are sought and demanded by the individual and it is our business as surgeons to act for the welfare of this individual who is looking to us for the exercise of our skill if we can conserve this individual in such a condition that the genital function is preserved along with the other functions of his body we have, in my opinion exercised the highest attribute of medical and surgical skill If we can only preserve the ability in that individual to copulate, even if we have to sacrifice his power to become a progenitor we have still accomplished a work that is an excellent one for the individual because it is a well known belief that the testicle, like all other glandular organs, has an internal secretion which is of value in conserving the balance between the different animal functions

Tuberculosis of the testicles commonly commences in the epididymis and is frequently confined thereto. *It is quite easy to remove* the epididymis and preserve all of the testicles to which an undiseased vas may be coupled up or the epididymis and its diseased vas may be removed and the healthy testicular substance still be retained or the epididymis

and the diseased portion of the vas and the portion of the testicle which is tuberculous may be resected and an attempt made to preserve the healthy or apparently healthy substance of the remaining portion of the testicle, if a sufficient blood vessel supply can be retained for this purpose.

I assure you it is rather wonderful what one can do with such a testicle. I have now a patient who had both epididymi removed in Chicago some five years ago neither gland was tuberculous, and he presented then no tubercular foci in the prostate, or bladder This man was married at the time and had a child he has continued in happy marital relations ever since, and both he and his wife state that these relations are regular and entirely satisfactory but there have been no more children. He ejaculates a fluid that has the appearance and odor of normal semen, and contains abundant lecithin granules, but no spermatozoa. He states that the sexual feeling is as strong as it ever was and that the orgasms are perfect. I have observed several cases of this kind, and quote this one simply because all of the circumstances attendant upon it are so fresh in my mind. This man now has tuberculosis of both kidneys, but both testicles appear healthy The bladder is not yet diseased though there is some irritation about the mouths of both ureters, and the catheterized urine from each kidney contains tubercle bacilli. Such being the case, what would have been the use of depriving this man of his testicles and thus preventing the five years of happy life he has had? He is not the subject of tuberculosis of the kidneys because his testicles were not removed five years ago but because he has the soil upon which the tubercle bacillus thrives, and his kidneys have become infected for this reason alone.

I have another case that is a still more remarkable proof of the value of conservative surgery as applied to tuberculous testicles. One of my patients, a man of 48 years of age has had tuberculosis of the lungs at intervals since 1901 with intervening periods when he was apparently in perfect health, with the lesions of the lungs cicatrized In January 1906 he was attacked suddenly by an acute tuberculous infection of the left epididymis. Within a week after the appearance of the first nodule the gland became painful, enlarged rapidly and a few days thereafter was adherent to the skin, broke down and discharged itself through multiple sinuses the scrotum became red and a destructive ulceration rapidly took place in it. On January 25th I removed the testicle, almost all of the scrotum on the left side and the vas as far as it was diseased, which was within three ccm. of the seminal vesicle. The vesicle itself did not feel diseased, either through the rectum or the abdominal wound. No attempt was made to close the wound it was left open, dressed with iodoform and balsam of Peru and exposed to the X-ray every other day for two weeks. The wound healed in a month.

In January 1907 the right testicle was attacked this process was very much slower From the beginning the entire epididymis was affected it became large, swollen, and hard and within two months formed adhesions to the scrotum, from which adhesions multiple sinuses communicated with the epididymis. There was no suppuration, but there was a sticky discharge, clear and thin. There was very great pain, apparently neuralgic, at the inguinal ring. On March 15th, for relief I removed the entire epididymis and the vas which was also diseased to within a few centimeters of the seminal vesicle. There was no evidence of any bladder irritation and nothing could be palpated in the vesicle or the prostate on this side. After the removal of the epididymis it was found that about one-fourth of the testicle at its upper extremity was the seat of a tuberculous gumma that had not yet broken down. This was resected carefully the tunica albuginea being preserved, as it was not adherent to the gumma and was not involved in the growth. The wound was left open and packed with iodoform gauze.

Early in April a necrosis of a portion of the adjoining tissue was noticed, and this part was resected on April th this left a little less than one-half of the testicle, hollowed out and apparently very unpromising The

edges of the tunica albuginea were brought together over this hollow and a minute strip of rubber tissue drain carried down inside of it. There was no suppuration following, but the wound was very slow in healing. The X-ray seemed to stimulate the infected wound upon the left side to speedy healing, but it seemed to retard the healing of the wound on the right side. The wound was dressed with iodoform and balsam of Peru, and tuberculin was administered every four or five days in ascending doses of 1–100,000 mgm., but it took about six months before a perfect cicatrix was obtained. Attacks of intra abdominal neuralgia at the internal ring continued at intervals for nearly two years they were extremely painful, and resembled attacks of appendiceal or renal colic. They rarely lasted more than a half hour and always left him completely exhausted. There was never any direct trouble with the bowels or with his digestive organs, so I could not bring myself to believe that the attacks were appendiceal, more particularly as there was never any pain over the appendix upon pressure. Ureteral catheterization and X ray pictures of both kidneys showed no disease of the ureters or kidneys. At the end of the second year the attacks disappeared and have never recurred since. These were probably due to inflammatory adhesions about the internal ring, for they existed after the disease appeared in the epididymis and before the operation, and he was free from them for a month or two after the operation then later when these adhesions had had time to form again, they recurred with great violence.

Remember this man has only one-half of one testicle left, but to the sense of touch and to the eye it is a very good one-half, quite as large as a whole testicle is in many men. But the testicle has no vas attached to it. Within six months after the last operation my patient was looking for a woman. He stated that his sexual desire was intense and his gratification was perfect. In 1909 he married, and is still married to the same woman. His tuberculosis of the lungs has caused him to spend his time in the mountains of Mexico or New Mexico for while there he has no active symptoms. He married because he knew from two years' experience following the operation, that he could live with a woman in sexual relations. Both he and his wife state that they have intercourse several times a week, and that he has perfect orgasms, but that there are no ejaculations.

Before closing I want to present an illustration of what may be accomplished toward the saving of a testicle that has been fractured or ruptured by direct violence and which would appear to be irretrievably injured requiring removal.

On May 16 1912 there was admitted to the Santa Fe Hospital, in Los Angeles, a man of 34, whose occupation was that of a brakeman. This man's left testicle had been injured in a railroad accident on April 5th. Immediately after the accident the left side of the scrotum began to swell and he suffered great pain there was much discoloration and ultimately great distention on that side. He was confined to his bed in his home in a country town for three weeks, When I first saw him the testicle was about three times the normal size, and the case had been mistaken for one of traumatic epididymitis. Upon my examination on May 2nd I saw that the case was one of hematocele and on May 23d, with the suspicion that, following the injury a sarcomatous change had occurred, I cut down upon the testicle and found the tunica vaginalis filled with half-organized blood clots. There was a large longitudinal tear in the tunica albuginea, through which extruded a mass of necrosed secretory structure, which included a little more than one-half of the glandular tissue of the organ part of this tissue was dead, and more of it was on the border line between life and death.

I determined to make the effort to save the remaining healthy tissue and encouraged by my assistants, resected all of the diseased tissue, hollowing out the structures underneath the tunica albuginea so as to be able to close the wound. The blood vessel supply was unimpaired, and the tunica albuginea was not necrosed, with the exception of a very small margin on the edges of the wound,

which was resected along with the dead testicular substance. The edges of the wound were then brought together by very fine sutures of No o catgut threaded into an eye-needle, and the tunica vaginalis resected and a new bed hollowed out for the testicle in the scrotum The wound in the scrotum was closed, with drainage. The testicles were placed upon a shelf and surrounded by ice caps, which were kept in place for four days. There was no swelling or inflammation following operation the drainage was removed on the second day he was out of doors on the seventh day and left the hospital in two weeks entirely well. This testicle to-day has the feel and is approximately the size of a normal testicle and to all indications and purposes it is so.

It is perfectly possible that, after long months of suffering the necrosed portions of this testicle would have separated from the healthy ones, and the result would have been the same — that is, the conservation of the healthy portion by nature but the chances are much larger that if this had been left to nature the testicle would ultimately have been lost.

These cases are cited merely as examples of what can be done toward conservation in cases of disease or injury of the testicles. I could fill a book with the histories of cases of tuberculosis of the testicles, apparently hopelessly diseased, which have ultimately been restored to good functional use by conservative medical and surgical treatment. The case of syphilitic testicles in which conservative treatment of a surgical nature can be practiced must necessarily be very few The cases of injury of the testicle in which an effort may be made or should be made to save the organ are not very many but if both sets of blood vessels leading to the testicle have not been destroyed, it is well worth while to make the effort, and it is often successful.

I am very well convinced that if Hagner's operation were more often resorted to in cases of gonorrhœal epididymitis, there would not be so many barren men as there are at the present time.

SOME USES OF FAT IN SURGERY[1]

By J F BINNIE, A. M., C. M., F A. C. S Kansas City, Missouri

FAT has an evil repute, partly because of the inconvenience inseparable from great obesity and partly because wounds through great masses of fat do not heal particularly well, and yet, as we will see, this abused tissue fulfils very useful functions. The most widespread tissue in the body is connective tissue, which serves many functions It binds various structures together it secretes various salts and so converts itself into bone, it forms cartilage, and it absorbs oil into its cells until each cell is a small bag of oil and constitutes fat — an extremely light and elastic packing and pad ding material, which can be reabsorbed and used as food when occasion arises.

Tumors of pure fat (lipomata) are common, and fat may increase locally in tumor fashion, as witness the increase in the omental fat contents of old irreducible hernia.

In spite of its reputation as a tissue of poor resisting power fat is well suited for transplantation. In many instances it is undoubtedly the connective-tissue basis of the fat which is of value in the transplant, but in other instances other varieties of connective tissue would be valueless compared to that which is infiltrated with oil.

I Hemostasis is often difficult to attain in wounds of the liver and like parenchymatous and vascular organs. Tamponade with foreign material, while useful, has obvious drawbacks. Sutures are liable to tear loose in the friable tissues. Such wounds may be treated by omental grafts in one of two fashions.

(a) Choose a fragment of omentum of suitable size and volume, ligate it, and divide it distal to the ligature. The fragment must be more than sufficient to completely fill the wound in the liver Plug the liver wound with the omental mass in such a fashion that the edges of the wound are overlapped by the omentum. Introduce sutures so that they pass in through overlapping omentum, through liver substance into the depth of the wound, and through the omental plug contained in the wound, to emerge on the opposite side of the wound after passing from within outward through liver substance and overlapping omentum. By perforating the overlapping omentum and the plug the sutures when being tied are less liable to cut through the liver substance. Loewy[4] finds that the omental plug becomes adherent to the raw surface of the liver wound prevents hemorrhage, and ultimately becomes converted into fibrous tissue. The exposed part of the plug does *not* become adherent to the intact peritoneum.

(*b*) Boljarski[3] and Stucky[4] have pressed free flaps of omentum into hepatic wounds as plugs, or have spread and pressed such flaps as plasters over raw surfaces such as may be left after a difficult cholecystectomy If the flap is pressed into its hepatic bed it adheres so well that sutures are unnecessary In a case reported by Stucky cystectomy was followed by free venous bleeding. Tampons, sutures, etc. failed to stop the bleeding As a last resort a free flap of omentum was pressed against the raw surface it adhered and stopped the hemorrhage. The patient died at the end of three days. The autopsy showed the graft absolutely adherent to the raw surface of the liver but *not* to the peritoneal surface.

A number of hepatic wounds have been successfully treated by omental tamponade. In a case of crushing injury W J Frick (personal communication) found many lacerated wounds of the kidney which bled freely Other methods of hemostasis failing he plugged the wounds with perirenal fat held in place by a suture and secured good results. Mayo Bastianelli, and others reinforce the suture, closing wounds of the renal pelvis with flaps of perirenal fat, and find them of much value.

After myomectomy the sutured uterine wound may be covered with a plaster con

[3] Arch. f. klin. Chir. xxiii.
[4] Arch. f. klin. Chir. xxvi, 384.

Read before the Clinical Congress of Surgeons of North America, Chicago, November, 1913

sisting of a free flap of omentum held in place by a few stitches (Mayo) This graft aids in preventing any oozing of blood. The omental grafts placed over intestinal wounds to prevent leakage of intestinal contents are methods of peritonealization and depend for their value entirely on their fibrous tissue constituents and peritoneal covering and not at all on their fat contents in fact, a very fat omentum, while desirable as a plug for liver wounds, is entirely unsuited to act as a plaster over an intestinal wound. The same is true for a procedure devised by the writer where he tied a free flap of omentum round the pylorus to permanently obstruct it after gastro-enterostomy had been performed.

II. Traumatic epilepsy is sometimes due to fibrous tissue changes in the pia and to adhesions between the meninges and their coverings (skull, scalp) The usual operative treatment of traumatic epilepsy consists essentially in the removal or elevation of any depressed bone in the excision of any irritating scar tissue or of any cystic formations, etc. Endeavors have been made to prevent the formation or reformation of adhesions by covering the cerebral or meningeal wounds with metallic foil, celluloid plates, rubber tissue Cargile s membrane (prepared peritoneum) egg membrane, hernial sac (fresh or prepared) fascia lata, etc. A successful ward politician of Missouri was in the habit of saying with regard to factions in his own party If you can t bate em, jine em so with regard to cerebral adhesions one may say "If you cannot prevent their formation, make them harmless

Rehn (in Lexer s Clinic) found that 45 days after a cranial defect had been filled with fat, a clear and distinct basal connective tissue sheet spanning the dural defect had developed in the transplant This sheet was elastic enough to permit of expansion and was in no way like the dense connective tissue usually present in cranial defects In Rehn s experiments the fat flap was spread on the pia, and naturally adhesions could not be avoided but they were never dense and extended they consisted of delicate easily separated fibers of connective tissue except when infection took place, when they were both dense and spread out. The following case may be of interest

L. A., aged 24 stationary engineer Admitted Kansas City General Hospital September 26 91 On May 13 907 a steam pipe, exploding, drove one end of the pipe into patient s right parietal region. He was unconscious for 24 hours. Operation was performed a number f fragments of bone being removed as well as some lacerated brain substance. When consciousness was recovered there was total paralysis of the left arm and partial paralysis of the left leg In three months the leg had practically recovered completely the arm was much improved and continued improving for three years, until now there is merely a partial loss of sensation in the fingers, sufficient, however, to interfere with work. When the patient bends down and rises again there is a painful sense of tearing at the site of injury and there is giddiness. There have never been any convulsions.

Three years after the injury the hiatus in the skull was exposed by operation, scar tissue divided, and the wound closed. As soon as healing was complete the old symptoms recurred. In the right posterior parietal region there is hiatus in the bone about 1 ½ inches in size. When the patient is lying down there is no depression of the scar but when sitting up the depression is marked. Sensation in left hand is so faulty he can rarely tell the position of the middle finger and that of the other fingers only with hesitation.

September 28 9 2 Reflection of scalp excision of scar tissue from hiatus in skull implantation of enough fat (from the abdominal wall) to completely fill defect. Closure of scalp wound. Healing per primam.

February 4, 19 3. The patient is at work. He feels and looks well can bend to floor and get up again without discomfort. There is now a depression at the hiatus, although two months after operation absence of depression was noted. In March 9 3, the patient reported himself well

It has appeared to the writer that where a cavity is left in the brain after removal of a tumor or evacuation of a cyst, if the cavity does not quickly disappear through cerebral expansion possibly a plug of fat might be a suitable tampon. The specific gravity of fat is somewhat less than that of cerebrospinal fluid. The writer has had only one opportunity to try the method and that was in a case of internal hydrocephalus following an old and severe trauma where, during operation, the ventricle was opened under the impression it was a cyst. Failure was a foregone conclusion.

III Many otherwise beautiful faces are deformed by the presence of depressed scars adherent to underlying bone Sometimes such scars may be neatly excised with gratifying results but sometimes such treatment is unsuitable or fails. Subcutaneous division of the adhesion between the skin and the bone may do good, but it does not replace the tissues the loss of which was the cause of the depression. If through a suitable incision the adhesions are thoroughly divided and if then (after hæmostasis is attained by pressure) a suitable mass of fat is gently insinuated through the cut to fill up the depressed area an ideal result may be obtained It is best to obtain the fat for transplantation from the patient himself (autoplasty) as homoplasty (i e transplantation from another individual of the same species) is not quite so successful and heteroplasty (transplantation from a different species) commonly fails.

IV After excising the breast for non malignant disease it is occasionally of considerable importance to reproduce an æsthetic swelling at the site of the mamma. Czerny had occasion to remove one breast and a *lipoma from the back of the same patient.* Instead of discarding the lipoma he planted it in the bed left by the mamectomy and obtained a good result.

Judd had removed a breast from a woman for non malignant disease and almost at the same time he operated on a large irreducible umbilical hernia. From the hernia he obtained a suitable mass of omentum and implanted it at the site of the mamectomy The graft lived and the cosmetic result was gratifying

Klapp in two cases after excision of the breast for benign neoplasm implanted masses of fat obtained from the patient own thigh From one of these patients a morsel of the implant was excised after the lapse of four months *and found to consist of living normal* fat with wide connective tissue septa Hertzler has had success similar to that of Klapp

V When disease has been chiseled out of a bone recovery is very slow unless the cavity left in the bone is obliterated by the art of the surgeon. The aseptic blood clot iodoformized decalcified bone chips, iodoform starch, iodoform wax, and various other plugs have all been used with greater or less success. Numerous plastic operations, by which pedunculated flaps of bone and skin have been transferred to and fixed in the cavity have all given a measure of success. Both Chaput and Makkas independently published in 1904 methods by which bone cavities might be obliterated by the implantation of *non-pedunculated masses of* fat.

Krabbel, from a study of ten cases in Garre's Clinic, comes to the following conclusions

1 In chronic osteomyelitis without fistula implantation of fat has made good. If fistulæ are present implantation is contra indicated.

2 Sharply delimited easily accessible tuberculous foci are suitable for fat implantation, even when they are situated near the articular ends of the bone. Diffuse tuberculous lesions of bone and widespread disease of the soft parts may only be plugged (with fat) after the most careful and accurate removal of *all* the disease If healing per *primam does not ensue promptly or if a* fistula forms, the implanted fat must be removed at once because of the grave danger of tuberculosis developing in the implant.

Chaput in 1913 reported to the Société de Chirurgie of Paris the case of a woman from whom he had removed an osteomyelitic focus eight years previously and in whom he had plugged the bone cavity with a free flap of fat After eight years of good health a new focus of disease developed near the site of the old lesion and the necessary operation permitted demonstration of the satisfactory healing in the bone of the transplant of fat made eight years previously

Makkas experiments show that it is almost always possible to close aseptic bone cavities with free flaps of fat even when these cavities communicate with joints The fat is sometimes changed into connective tissue sometimes it persists but the plug is always (Makkas experiments) surrounded by a new formed layer of compact bone derived from the walls of the cavity *In one of Makkas*

[illegible]

three successful cases in man the cavity was infected with staphylococci.

In extensive chronic osteomyelitis of the humerus with fistula, M P Lawrow[1] reports healing in about three months, although there was "partial wound suppuration."

The writer has made use of fat to fill the cavity left by removal of a metacarpal tuberculous focus and was gratified with the result.

In any operation where an infective focus is excised from a bone and the resulting cavity is to be plugged with any suitable material it is important to operate in a well-ordered, rather formal, systematized manner. Operation may be carried out somewhat as follows: (1) Remove all evidently diseased or infected tissues and sterilize the wound with pure carbolic acid neutralized afterwards with alcohol (Harrington's solution or pure formalin solution may be used). Pack the wound with gauze. (2) Let the surgeon and assistant put on clean gloves. Prepare the region of the wound as if for a new operation. Using freshly sterilized instruments remove the pack from the wound and with chisel or burr cut away a layer of bone from the walls of the osseous cavity. Once more chemically sterilize the cavity and wash away the chemical with salt solution. Pack the cavity. Once more change gloves and instruments. (3) Obtain a mass of fat of suitable size, preferably from the patient himself. Do not touch the fat transplant with the fingers but lift it in forceps with the least possible trauma. Remove the pack from the bone cavity. Completely fill the bone cavity with the fat transplant. Close the wound without drainage. Only by some such systematic procedure can asepsis be reasonably assured.

VI. *Arthroplasty.* When a bony ankylosis has been divided and the articular ends of the affected bones have been properly modeled their reunion may be prevented and a new joint may be obtained by interposing living soft tissues between them. Murphy has done very much to develop arthroplasty. In his work (and the writer pleads guilty to the same fault, if it is a fault) he has been careful to use *pedunculated* flaps of fat. To use flaps provided with pedicles complicates the operation considerably and it seems to the writer that once the flaps are twisted into position the pedicles are of very doubtful value. If free, i.e. non-pedunculated flaps of fat and fascia thrive in other situations after transplantation, why not when used in arthroplasty? Ropke has been successful in using free transplants of fat, even as large as the hand in arthroplasty.

VII. After tenorrhaphy or neurorrhaphy it is very important to prevent the line of union from becoming closely adherent to neighboring structures. There is no better prophylactic measure than wrapping a free or pedunculated flap of fat around the part to be protected.

VIII. In pulmonary tuberculosis and in bronchiectasis various operations have been devised to put the lung at rest and to cause any pulmonary cavities to collapse. Artificial pneumothorax or the filling of the pleural cavity with nitrogen. Friedrich's operation of excision of the chest wall. Sauerbruch's and Wilms's operation of extensive rib section causing collapse of the chest wall,—all these are endeavors to attain the same end. Tuffier[4] has successfully grafted voluminous masses of fat between the mobilized parietal pleura and the ribs in bronchiectasis. Paraffin wax of low melting point has been used instead of wax. The same method may be used to close suppurating and tuberculous pulmonary cavities.

THE RELATION OF THE DUCTLESS GLANDS TO THE WORK OF THE SURGEON[1]

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DURING recent years I have realized ever more forcibly the growing importance of the subject selected for this address and therefore I make no apology for its introduction upon this occasion. Those audiences before which I have already discussed some of its phases and aspects have been so small compared with this that a reiteration of presentation of certain of its features previously made calls for none. But before this large and unusual audience assembled from all parts of our country it seems desirable to first call attention to certain generalizations essential to a more ready comprehension of that which may follow.

The internal secretions, so often spoken of as hormones, exercise an apparently controlling influence, hitherto but crudely appreciated, on many of the organs and functions, and this not alone on the ordinary body functions, but on the nutrition and regulation of individual organs and their particular activities, even to the extent of becoming responsible for the development of certain mental traits or personal characteristics which may make or mar the individual, and may thus affect both his physical and intellectual welfare.

For example, dwarfing or gigantism, each of which seems due to perverted activity of one or more of the ductless glands, naturally affects the social and school life of a growing child, and to such an extent that when conspicuous deformity results the entire course of life may be affected to an extent which is appalling. Such defects, for instance as are to be noted in a rachitic child may by making him an object of ridicule among his playmates, entirely change his nature and disposition and thus change his temperament and his life work. Such consequences are by no means so indirect as may at first appear. The early effect of hypo- and hyperthyroidism, thymism or pituitarism need only to be better known in order to have this significance better appreciated. So too, with regard to several of the mental derangements which in time past have brought the young and growing child, the adolescent, or even the adult to the operating table we may now realize that in their inception, at least they constitute expressions of over or underactivity which had they been recognized early, might have been prevented or at least avoided by a suitable opo- or organotherapy.

Conditions of this sort then have led to an ever-strengthening conviction on my part that even as surgeons, we need to apply the most exact attainable knowledge of the ductless glands and their significance (so soon that is, as the physiologists furnish it) to our orthopedic and our numerous other cases of arrested or perverted development. And if that most excellent definition of the surgeon be true which some author to me unknown has perpetrated namely that a surgeon is "a physician who knows how to use his hands" then it doubly devolves on us to cultivate this field of research.

So much, then by way of introduction.

And what then, are these most important parts of the body that play such a mysterious yet imperious rôle in influencing development and welfare? Our literature is now rich in essays or monographs dealing with the internal secretions, and the recent large works of Biedl and of Falta superseding to some extent the memorable monograph of Sajous, are monuments to the industry and research of their authors. Continental authorities, German especially, seem to have contributed much more to this subject than have our English colleagues and it is interesting if not significant that both the recent authors just mentioned are members of the Vienna Faculty. There should however be mentioned

[1] Read before the Thirty-... Congress of Surgeons of North America, Chicago, November ...

along with these books the recent excellent work of Gilford

Take for instance the overproduction of adipose tissue — not alone that form which constitutes general adiposis (often dolorosa) but the earlier forms, which in many respects more or less resemble cretinism. These deposits are serious impediments to the welfare of patients young or old and produce difficulties well nigh insuperable in certain surgical cases. To the perverted activity of which ductless gland is it due — pituitary thyroid or genital? In relatively few cases can we as yet decide. Still less can we assign to any one of these glands its exact rôle in this complicated and generalized fat deposition.

Still less, too are we able to fix responsibility on these small organs in cases of retarded mental development, occurring as they do at times in children dwarfed in stature or again in those of precocious growth equally uncertain are the reversed features of mental precocity in those of diminished skeletal growth. Imbecility then, with or without manifestations of cretinism is let us say a frequent result of the perverted development which is ascribed to altered and abnormal hormones

While surgical operations may then be requisite to meet particular indications it would be a mistake to subject every microcephalic child to a craniectomy Such mistakes I have myself made in time past, having operated, as have others on numerous children belonging to this class with only a modicum of success The furor for this kind of surgery of the cranium has passed but a most valuable lesson has been impressed, namely that we should estimate general and especially hormonic conditions much more accurately before resorting to manualization The principal argument in favor of such indiscriminate operative work would rest with those advanced thinkers who in such cases see in euthanasia a boon to the race in general and an indirect benevolence to those vitally and parentally concerned.

According then, to the teleological views of the individual will such efforts as these be favorably or unfavorably regarded. If operative surgery is to be the aim and end of professional endeavor then the attempt to restrict rather than expand its field will not meet with approbation if on the other hand an operation be regarded as but a means to an end then every conscientious practitioner will welcome the effort to attain that end by some less hazardous, more promising and safer course especially if it be founded on a more accurate apperception of fundamental conditions.

The doctrine, not the theory of internal secretions was not yet born when, in 1889, Brown Séquard reported his first memorable experiments in a communication to the Société de Biologie The theory of these secretions was perhaps a hundred years older and was the outcome of notions according to the old humeral pathology that the blood stream contains abnormal products from various organs It was the outcome of an analysis of the changes ensuing upon castration, followed by the transplantation experiments of Johannes Müller who recognized secretory activity in cells and in the membranes and glands composed of them whose products exercise an internal rather than external and visible influence. Berthold, in 1849 had already proved this by his experiments, though his deductions were not recognized by such investigators as R. Wagner Claude Bernard was probably the first to accept the doctrine and to use the term internal secretion.

Of these hormones some are produced from membranes, e g in digestion others are formed within the ductless glands whose products apparently enter the venous capillaries. To all of these is given the collective name *hormones* implying thereby their property of acting as stimuli to some other organ or collection of cells different from those which produce them. Their recognition has served to better explain many obscure processes, while at the same time it has complicated our proper appreciation of the multiple and reciprocal activities of various parts of our bodies. Nearly all if not all of the organs and secreting membranes of the body act in

Gilford, "The Disorders of Post Natal Growth and Development," London

this way i.e., they affect the function of other organs or membranes, although in our present state of knowledge the true blood forming or blood-elaborating organs (spleen marrow lymph nodes and hæmic glands) are excluded from this category

It will appear further along that this doctrine relieves the autonomic (or vegetative) or sympathetic nerve-system of some portion at least of the work which we have hitherto credited to the trophic nerves. Strictly then, the list of ductless glands should be thus made up

- Hypophysis {Anterior / posterior
- Epiphysis or pineal gland
- Thyroid
- Parathyroids
- Thymus
- Adrenals (medullary portion) and the entire
- Chromaffin system
- Pancreas (intertubular cell groups Islands)
- Genital glands {ovaries / testes

To these may be added

- Breasts
- Tonsil
- Carotid and Luschka glands These will receive but casual if any mention in the present consideration since our knowledge of their utilities or purposes is yet too vague This may also be said of the pineal body

The *embryonic origin* of the ductless glands is of importance because some of them are of distinctly epi or hypoblastic origin others of mesoblastic The anterior hypophysis is of the former i e ectodermal while the posterior portion is *neurectodermal*. The thyroid is entodermal being developed from the anterior wall of the craniopharyngeal canal and the pharyngeal clefts on either side It is of interest that both the anterior hypophysis and the thyroid were at one time and originally active glands emptying their secretions into the primitive alimentary canal

The thymus is of essentially the same origin as the thyroid, hence perhaps the peculiar relations between the two The islands of the pancreas, which interest us in this connection, are also entodermal, developed from pouches formed around its ducts.

The adrenals are of mesoblastic origin, developing from the coelomic epithelium The genital glands also are of the same origin. There is, moreover a striking resemblance in many respects between the cells of the adrenal cortex and those of the interstitial genital glands. The chromaffin tissue or so much of it as is not included in the adrenals, probably is of ectodermal origin.

Thus it will be seen that all three layers of the developing embryo are concerned in the formation of one or more of these bodies and that both the genital glands and adrenals are developed from the epithelium of the coelom.

Here and later it is desirable to emphasize the reciprocal relations obtaining between those organs which have so much to do with the development of the skeleton, and to note how any disturbance of these relations may produce skeletal defects Even deformities which seem at first trifling may have far reaching consequences from such distortions of the upper part of the body as may indirectly affect nutrition Quite recently Preiser has described at length the static joint disease which leads to faulty attitude produces inertia and indirectly affects the life history of the individual One must not forget however that changes from the archetype which were produced by man's assumption of the upright position have brought about many indirect disturbances, especially about the pelvic girdle. The correct architecture of the bony skeleton may be notably perverted in this way since it has permitted so many visceral ptoses, as well as changes in circulation of the abdominal viscera, that the nutrition of a number if not all of the ductless glands has been affected.

A very imperfect and partial list of conditions evidently due to hormonic disturbance would at least include the following

- Acromegaly
- Hydrocephalus internus, resulting from obstructed discharge of the posterior pituitary into the cerebrospinal drain
- Graves disease with or without persistent thymus, and even hibernation

Myxœdema and cretinism
Tetany
Thymic asthma and the status lymphaticus
Rickets
Achondroplasia
Obesity
Addison's disease
Sexual changes, including amenorrhœa, eunuchism etc.
Mental defects of various types — infantilism mongolism, and the other extreme mental precocity
Skin dystrophies including dryness or the reverse i.e. excessive perspiration, loss of hair or other changes
Neurasthenia of certain types, especially that with moist, clammy skin, bright restless eyes glossy hair exaggerated reflexes muscle tremors, abnormal hunger diarrhœa, menorrhagia, insomnia exaltation of special senses, hot flashes frequent pulse etc

Here the benefit from suitably directed organotherapy is sometimes striking Thus we are seeing daily and all around us instances of perversion of the internal secretions, yet without knowing just how to distribute their symptoms or assign to each ductless gland its part or share in the guilt we are therefore, almost powerless to help Hence it is that we have so often to resort to the therapeutic test, namely to administer first one and then another of the extracts until we determine which is indicated.

Another most important feature is the evident antagonisms which prevail between certain of these bodies, now one, now another acting as regulator or governor of the production of some other gland thus between the thyroid and the genital glands marked relationship is evident, since menstruation may be restored and pregnancy possibly occur after myxœdema and cretinism have apparently been cured by thyroid extract.

Many of the unpleasant features of the [illegible]

menopause are apparently due to hyperthyroidism and may be relieved by administration of ovarian or corpus luteum extract. Again, according to Kidd the pineal body furnishes a hormone which has marked inhibitory effect on the genital glands. Inasmuch however as it undergoes only partial involution at puberty it may also have some other effect. Little is known of the pineal body but we may be sure that it has at least some more tangible function than being as the ancients supposed, the seat of the soul.

Between the thyroid and the pancreas too there seem very intimate relations, as also between the pancreas and the parathyroids with the hypophysis and the entire chromaffin system.

The hormones fall into two groups the *upbuilding* and the *destructive* while each group exerts an inhibitive effect upon the other Overgrowth i.e., gigantism implies decreased or inhibited disassimilation Normal growth, i.e. activity implies an equilibrium maintained Complicating all these growth features appears the as yet undetermined influence of the nervous system. What difference will later be made in our notions regarding the trophic nerves remains to be seen

Hormones are by no means necessarily complex chemical bodies from adrenalin (methylamino alcohol of pyrocate) as one of the most complex, we have simple carbon dioxide at the other extreme

From surgical experiences much has been learned e.g. from cachexia strumipriva and ovaripriva and from post-operative tetany while experimentation has proved invaluable most of our practical knowledge having come from these two sources Were it not for a study of the results of removal of the hypophysis and other organs mentioned above our acquaintance with this subject would be very limited

Internal secretory organs labor under the disadvantage that they can only expel their products into the blood, since they have no duct. Hence if their secretions become in any way abnormal the blood nevertheless carries them everywhere, and they must either be neutralized or antidoted or the body will

suffer The liver is our best illustration of a secretory organ antidoting its own output urea is the main end product of albumin metabolism and by means of it the liver regulates itself altering it to the desirable extent. Cretinism on one hand and exophthalmic goiter on the other furnish illustrations of a ductless gland which has not the capability of regulating its own production. A change, especially a sudden one, in the number of ions of the metals of the alkaline earths (K Na Ca, and Mg) causes immediate and notable effects on function. Muscular irritability' e g depends largely on the calcium salts, and their presence or absence is the factor upon which depends muscle repose or constant rhythmic contraction. It is secretin e.g also which determines in a way the closure or opening of the pylorus Such a surgical condition then as pyloric spasm may have much to do with the internal secretion and hence the value of calcium salts in surgical therapeutics. We may replace a hormone but not a real secretion.

Having spoken of antagonisms let us mention also similarities As between the thyroid and the anterior pituitary let us remember that phylogenetically both were once glands with an external secretion, and that they have morphological similarities. Animals deprived of either behave in much the same way they remain small evince similar vegetative symptoms and become ill in much the same way In acromegalics the thymus often enlarges just as when the thyroids are overactive. In cretins we often find degeneration of the hypophysis similar to that of the thyroid and when pluriglandular symptoms appear they are nearly alike.

Between the thyroid and pancreatic islands similarity obtains in that in typical myxoedema, carbohydrate assimilation i increased and glycosuria occurs, while after disease of the islands the same takes place in fact both these conditions prevail after extirpation of either part.

So far as the pancreas and the adrenals are concerned, in that form of chronic alcoholism where the pancreas is involved as well as the liver we find pigmentation of the skin much resembling that of Addison s disease, and even though the diabetes due to involvement of the pancreas may later subside, the bronzing due to adrenal cirrhosis does not disappear

There are two methods of approaching or presenting the subject to which your attention is invited

First, by cataloguing the organs and their functions, and making the attempt to list the morbid conditions due to their disturbance. This may be called the anatomico-physiological method.

Second by cataloguing the various general conditions under consideration and interrogating the various organs with a view to fixing the blame. This may be considered the clinical method.

Each of these has its advantages and its difficulties, among them this especially — that each is characterized by a most confusing overlapping of facts due to the overlapping of functions. Thus, in the matter of skeletal growth this apparently is regulated in the very young by the pituitary and the thymus, but that peculiar dystrophia adiposo-genitalis which is the principal feature of hypopituitarism is seen also in hypopinealism and hypothymism

We will begin with the first method selecting the more important organs and first discussing them separately

THE HYPOPHYSIS

As a whole, this is a persistent organ and therefore must have throughout life a continued function. Extracts of the whole gland increase blood pressure, cause uterine contraction increase peristalsis, lower carbohydrate assimilation, and have a mydriatic effect. Used to excess they cause emaciation, degeneration of the liver and increased metabolism. Extirpation produces in animals a peculiar cachexia, reduced pulse rate and respiration, fibrillary tremors, and death in apathy and coma

The hypophysis probably undergoes an epochal overgrowth at puberty This may have causative results, since it might account for the transient glycosuria seen at that time

and for the marked changes which occur in the sex organs Conditions simulating hibernation in man often yield to pituitary extract.

Symptoms of impaired activity include local œdemas of the skin and superficial fat anywhere about the body face, arms, hands, etc., as well as a dry harsh condition of the skin, with bristly hair which is easily and early lost. The external appearances are very similar to those of myxœdema, while temperature becomes subnormal Indications of impairment in the anterior lobe include retardation of skeletal growth with excess of fat delayed ossification as shown by skiagrams, mental dullness and irritability with transient glycosuria

Indications of impairment of the posterior lobe include a high tolerance of sugar with resulting though indirect adiposity polyuria, sexual impairment, with atrophy even to the degree of sexual infantilism.

So marked are the relations of the anterior pituitary and the sexual system that some have even considered parturition to be due to the final accumulation of pituitary secretion. At all events, this latter might account for the glycosuria of pregnancy moreover after multiple pregnancies we frequently see adiposity loss of hair changes in the skin and a subnormal temperature all of which are evidences of hyperpituitarism

The overgrowth of the pituitary sometimes occurring after typhoid fever or its clinical evidences are to be considered as the result of toxins which stimulate its own growth, as well, perhaps as that of the epiphyseal bony boundaries, thus accounting for excessive overgrowth after this fever Something of the same kind is often seen after marriage, when the stimulation of the sex glands seems to extend in a short time to the hypophysis.

The anterior hypophysis discharges its secretion directly into the blood stream It has, moreover its own separate blood supply Its total exturpation in healthy animals seems to prove fatal It seems to have a very important part in regulating skeletal growth its enlargement being usually followed by acromegaly and hypertrichosis. It also enlarges during pregnancy and to some extent after removal of some of the other ductless glands, presumably as a compensatory feature.

The posterior hypophysis has also its own blood supply and discharges its secretion into the cerebrospinal lymph When over active it produces adiposity and changes in the skin similar to those of myxœdema, causing it to become dry coarse wrinkled and furrowed It has much to do with the sexual system and causes dystrophy and atrophy of the sexual organs. It seems to retard rather than promote skeletal growth. When overactive it leads to a high sugar tolerance and when underactive to a conversion of sugar into fat, with increase of weight. When enlarged it exerts pressure and may thus lead to hydrocephalus internus. Its extract acts as does adrenalin, is a powerful galactagogue, and increases peristalsis. When overactivity gives way to reduced activity the skin becomes œdematous and characteristic psychic disturbances are met, such as drowsiness, hibernation, even epileptiform seizures

In brief the symptoms of dispituitarism may be briefly summarized as follows

Reduced activity	Adiposity Sexual infantilism Skeletal infantilism
Overactivity	Gigantism—type Launois in the young, Acromegaly—type Marie in old.

Pinealism may simply be mentioned here as characterized in children by abnormal growth including that of the hair obesity (adiposity) drowsiness and precocious (premature) sexual development all of which may suggest the existence of tumor of the pineal body or at least of overgrowth. In these sexual traits there would seem to be an antagonism between the pineal, which causes premature development, and the hypophysis, which causes rather the reverse. It includes also hypertrichosis, static irritability oculomotor paresis and hydrocephalus internus (pressure?)

The enlargement of the hypophysis during pregnancy is of peculiar interest and has only recently attracted attention. It pertains mainly to the anterior lobe which at

tains sometimes a size two and one-half times greater than the normal, while of this increase in bulk at least four fifths appears to be made up of new formed cells In fact it is occasionally large enough to make pressure on the chiasm and thus seriously compromise vision even to the extent of temporary blindness which, as all know sometimes occurs during pregnancy It is accompanied by noticeable changes in other parts of the body especially the upper such as formation of osteophytes on the inner surface of the skull, deposit of calcium salts about the upper jaw nose temples, and ridges and an entire change of facies including thickening of the nose and lips, and even enlargement of the glands all of which are most suggestive of acromegaly In fact March has reported a case of outspoken acute acromegaly occurring during pregnancy

To be more descriptive and complete the *symptoms of involvement of the hypophysis* include the following which are usually distinct and definite enough to aid generally in localization Severe persistent headache due to increased intracranial pressure particularly well marked when the body is large enough to press upon the optic nerves and especially in the upright position Exophthalmos, which is not outspoken and is due to pressure upon the veins (Cushing) along with trigeminal neuralgia, with fullness and tortuosity of the veins of the scalp These symptoms are often accompanied by adenoids Skeletal overgrowth, including gigantism and acromegaly between which a distinction is certainly to be made. Massolongo's epigrammatic generalization that "acromegaly is delayed gigantism has been quite generally accepted as well as that of Launois and Roy that gigantism is the acromegaly of subjects whose epiphyses are not yet ossified as they should be at their respective ages However we must emphasize that not all giants are acromegalics, and here perhaps may come in the important distinction between the gigantism of pituitary origin and that chargeable to the thymus.

Skeletal undergrowth infantilism, and the like pertain to very early perhaps to prenatal influences. We must distinguish between the infant dwarfism of Lorain and true nanism where only certain morphological proportions persist or are retarded. The former is in fact best termed miniaturism, where the development is throughout symmetrically retarded. We have also to distinguish between *aidleris* or perpetual youth, and *progeria* which means an anticipated old age This distinction is of course easy We must also remember Herter's type of infantilism which is really due to a chronic intestinal infection as well as the experiences of others who have shown that by feeding young animals isolated proteins alone actual growth is inhibited although body weight seems to be maintained

As between the hypophyses and the sexual glands there seem intimate relations. The result of castration is increase in size of the pituitary Fischera and others have shown that in capons and oxen the hypophysis is often double the size of that in cocks and steers. Jutaka Kon has observed the same enlargement in bodies of castrated women, while others have reported it among the Skoptsy

If there be truth in all this, then some of the popularly dreaded results of castration in women may be ascribed to hypophysial enlargement and to other phenomena which follow it While all of this seems rational and is certainly interesting Falta nevertheless takes exception to it.

Influence of the Ductless Glands in General on Growth and Development

In youth a loss of the genital glands leads to overgrowth of the truncal skeleton, while the cranium does not seem to grow so fast. The distribution of fat about the body is disturbed Epiphyseal consolidation in those locations where it naturally occurs least or last is delayed. This will account for the overgrowth, and it is not necessary to seek for its cause in the pituitary The sexual glands, especially at puberty exert a marked influence over the development of the bones during the last portion of adolescence.

The thyroid when early lost or reduced

in size or when it has suffered involution seems to cause dwarfism or limitation of growth in every dimension. The fontanels remain open, the root of the nose sinks in, and enchondral as well as periosteal ossification is delayed.

Early involvement or defect of the hypophysis is also followed by limitation of skeletal growth, but not so marked as that due to defective thyroidal influence. In some respects it is harder to distinguish, but when the hypophysis is involved development of the genitals and the interstitial glands is even more marked. Acromegaly in the young is accompanied by more than marked eunuchism and its secondary sex characteristics are more pronounced.

As between dystrophy of hypophyseal origin and true infantilism it is to be noted that in the former the mind is but slightly affected while there is frequent headache sometimes with vomiting and that in the latter the mind is of infantile type and headache and vomiting are uncommon.

Only when the ideal type or model throughout the body is maintained can we assume a perfect harmony of action between these various glands. Departures from the standard can often be ascribed to or found in disturbed relations or possibly perceptible or even visible alterations

Infantilism

This name was suggested by Lasegue as descriptive of the persistence of infantile conditions and growth into the years of adult life Its first accurate description was given by Lorain, and the first good case record is that of a 24 year-old female dwarf by Dancel and Baillager

The type is susceptible of further classification for instance Brissaud describes a form which he considered due to early thyroid infantilism as distinguished from the Lorain type, which to him is due to a general and complete retardation, arrest, or defective development in which no one particular organ is at fault

Perhaps the best classification of types of infantilism is that offered by Anton, and is as follows

Infantilism with myxedema and cretinism
Mongolism
Infantilism due to inactivity of the genital glands
Infantilism with primary disease of the visceral glands, namely thymus adrenals, and pancreas
Dystrophic infantilism due to
Vascular insufficiency
Primary brain lesions of one or both hemispheres
Hereditary syphilis
Alcoholism and other poisonings (habit or occupational) or by inheritance
Early and precedent tuberculosis, chlorosis, or cardiac lesions
Starvation bad food environment, or faulty position (as in school) typhoid malaria, pellagra, etc.

To these Falta adds

Infantilism due to partially defective activity of the genital glands
Infantilism of true psychic origin (whatever that may be)

Schuller would make but two principal types namely

A dystrophic type due to hereditary or prenatal, i e., very early influences
An acquired type due to distinct abnormality in one or more of the ductless glands.

In all of these forms there is subinvolution of the entire lymphatic apparatus, while ossification proceeds irregularly and body proportions are either reduced or altered. Our perception of irregularities of ossification has been made possible only by use of the rontgen rays.

Dwarfism

Dwarfism differs from infantilism in this, that symmetry of development is not maintained and is to be distinguished from true infantilism, for which perhaps the best name is *miniaturism* of which Paltauf gave probably the best careful description in 1891 In dwarfism the infant is normal at birth, after which it may assume either of two distinct types or perhaps an intermediate form. These are

Primordial nanosomia, where the changes begin at or before birth and

Infantile nanosomia, where they begin in infancy or early childhood.

To these might be added

Rachitic dwarfism, combined with or dinary manifestations of rachitis, while mentality is not affected and the sexual system is normal and

Achondroplasic dwarfism combined with abnormal ossification and hyperplastic exhibits at the epiphyseal joints, clubbing etc. Here periosteal bone formation may be excessive and deformity of skull and spine often occurs as well as too early synostosis of the cranial sutures.

Mongolism

This type was first described by Langdon Down deriving its name from the resemblance in physiognomy to that of the Mongolian races. It is characterised by a small skull, with a round small fissure between the eyelids which has an oblique direction (sometimes with epicanthus) nose small and even button-like with sunken root or bridge small mouth, with di proportionately large tongue often visible in repose, and cracked protuberant lower jaw hair soft and silky eyes small and the external ear somewhat triangular in shape The thyroid is visible and palpable. The cranial openings persist, and the teeth are defective Ossification is nearly normal. The skin is smooth and soft and general adiposity is frequent The pseudolipomata of infantile myxedema are not present The genital development is usually normal, and mentality is rarely seriously impaired

Gigantism

In this condition as differentiated from acromegaly it is difficult to state just where abnormality begins, but it is usually with evident disproportion or disturbance of the normal symmetrical type, sometimes accompanied by *disturbance of function as in* eunuchism. So far as types are concerned there are practically but two — the *eunuchoid* which may be described as infantile early or late and the *potent* type, in which the sexual function is not disturbed. Little is required in this description save to remind that, as a rule giants are short lived. Gigantism is usually accompanied by overactivity of the adrenal system.

Differential diagnosis as between dystrophia adiposogenitalis due to influences relating to the hypophysis as compared with that form pertaining to defects in the genital glands may perhaps be assisted by the following presentation

Hypophysis at fault	*Genital glands at fault:*
Usually accompanied by symptoms of brain pressure	There are no intracranial symptoms.
Reduced carbohydrat metabolism.	No changes noted.
Early closure f epiphyses.	Epiphyses easily later
Little alteration of body proportions or dimension	Dimensions reduced (height and width together); gynecomasty in severe early cases; in some of these growth may cease

THE THYROID

Even to-day there is much to learn concerning the functions of the thyroid. It was once regarded as a reservoir by means of which blood pressure in the brain was equalized. *It seems to have an influence on the formation* of the blood slightly resembling the action of the spleen possibly vicariating for it. The most important part of its work appears to be elaboration of *iodothyrin* Certainly iodine is its most important constituent, and in this the thyroid is richer than any other organ. In effect or accurately speaking this is really an iodothyroglobulin, which forms a large part of the weight of the thyroid (from one-third to one-half) and even three-fourths of the weight of colloid goiters. In goiters quite free from colloid the thyroglobin contains no iodine, and in hyperplastic (exophthalmic) goiters it is reduced in amount while in the latter the phospho-albuminoids are increased. (Thyroidin may be made by

Very recently the French have been describing several types of pseudoacromegaly [illegible] showing that appearances of the skin which we consider especially characteristic of old age [illegible] occur [illegible] Oct 15 and an Italian, Cesari in [illegible] volume distinguishes the following forms

Considerable pseudo-acromegalic [illegible] hereditary form.
Syndrome pseudosenile
Genito-lateral genito-dystrophic with [illegible] in other respects, [illegible] with [illegible]
Considerable genito-dystrophic [illegible] without
Among other points he [illegible] for discussion and elaboration principles [illegible] appearance of the integument of the face remarkably resembling that of the skin of an octogenarian

boiling the thyroid for several hours in a 10 per cent solution of sulphuric acid and extracting the residue with alcohol.) E. Cyon thought iodothyrin was formed rapidly when the thyroid is flushed and that it stimulated the regulator nerves of the heart and thus relieved the blood vessels, permitting their expansion and thus reducing blood flow to the brain.

The thyroid seems to regulate or lessen deposition of fat and by regulating those organs which if overactive seem to retard it, to permit normal growth to occur It seems also to exercise a general regulator control over most of the other ductless glands, less so upon the adrenals than upon others. It affects especially the vegetative nervous system — that is, the sympathetic Its hormone reacts on the very nerves which supply it, stimulating the vasomotor and perhaps inhibiting the pneumogastric. Between it and the female generative system exist most intimate relations, since it increases in size during menstruation and pregnancy and even sometimes on defloration

Its true purposes have been made known as much by the consequences of its removal as by experimentation Of these, one type appears promptly and is characterized especially by muscular spasms and tremors and by many other features and the other type slowly in which type nutritional changes, cachexia, etc appear There also occur intermediate or transitional forms.

By experimentation it has been shown that extirpation of the thyroid in the carnivora causes early death, and among the herbivora chronic cachexia Later it was found that the parathyroids were essential even in the herbivora and that if they were all removed any animal, even man, would die. Thus it was demonstrated that the thyroid itself is less important than the quartette of small parathyroids In general, then regarding the function of the thyroid it may be said that its final product is a hormone which is passed into the blood as an iodo-albumin and that this modifies the activity of several other organs thus it promotes catabolism and increases normal function It helps in the disassimilation of a number of substances by producing others which affect the heart, the sympathetic nerves, the hypophysis, and the adrenals. It promotes skeletal growth and the development of the sexual glands, and it limits the internal secretory function of the pancreas. Whether this is done by direct contact with the tissue elements of the organs affected or through the mechanism of their nervous supply is as yet uncertain For example it may affect directly the sexual apparatus or by influencing the pituitary Opinions differ as to whether there is more than one thyroid hormone but at present the sentiment of the physiologists is in favor of a single hormone

In any discussion of this subject we must not omit from consideration the fact that the thyroidal function may be more or less disturbed by the toxins of a chronic intestinal infection especially in infants, which may thus result in disturbed relations in the whole ductless gland system.

Symptoms due to removal of the thyroid appear in at least 70 per cent of cases after extirpation, and Kocher has placed seven years as the possible duration of life after complete thyroidectomy When these symptoms do not appear their absence must be due either to accessory thyroids or incomplete removal of the main body Cachexia may appear even after partial removal, though in mitigated form. Horsley thought at first that six-sevenths of the entire thyroid might be removed with safety but Kocher places it at three-quarters while a spontaneous recovery from symptoms is possible, this must be due to hypertrophy of the remaining portion, which may even be regarded as a form of autotransplantation. On the other hand, even when an apparent abundance has been left the remainder may undergo such degeneration as to cause cachexia We must not mistake every thyroidal enlargement for true goiter It may be due to really degenerative changes with suppression of true function We must not forget Kocher's statement— there are goiters and goiters.

In the young and growing animal the most constant evidence of thyroid insufficiency

is disturbance in growth shown by retardation in length and height (that is dwarfing) due to imperfect ossification with sexual infantilism and retarded puberty and often also by arrest of mental development with impaired intelligence clumsy locomotion and the general conditions suggestive of cretinism Adults show lassitude or inertia muscular asthenia mental inactivity waxy thick and puffy skin with consequent immobility of the face muscles and lack of expression anaemia or subjective sensations of chilliness oedematous mucous membranes in the pharynx, nose conjunctiva etc and they complain of pains in the limbs and joints. Menorrhagia is the most frequent of features peculiar to women while during pregnancy all the above signs and symptoms are intensified. Sterility is the rule in both sexes.

The relations of Dercum s adiposis dolorosa to the thyroid are far from clear though the lassitude and mental apathy just mentioned, sometimes with psychic exaltation are suggestive in spite of what we have learned regarding the hypophysis nevertheless the enlargement of the latter with atrophy of the genital glands, may point to a diverse etiology

Much stress has been laid on the fact that senility is characterized by atrophy of the thyroid along with many other changes The latter are so numerous as to make it uncertain whether thyroidal atrophy is a cause or result, but there is much in the typical senile condition of the skin to suggest it.

Hypothyrosis includes infantilism then, but comprises much more It was Virchow who brought into prominence certain ethnological features and who introduced the terms *nanosomania infantilis* and *primordialis* subsequently accepted by Paltauf and others. In the former the young child after having a fair start, ceases to grow In the other dwarfing is due to arrest almost at the outset In the former the babe is of normal size at birth but at some later yet early period ceases to grow In the latter it is a miniature even at birth yet may attain a sort of completeness, with complete ossification and sexual maturity Some great men have apparently been of this type Adults of the infantile type have been described as appearing like ordinary men and women viewed through the wrong end of an opera glass (Dayon)

In achondroplasia there are no characteristic mental defects but the body displays striking disproportions such as shortness of limbs and relatively greater length of trunk and head Its most pronounced pathological feature is defective epiphyseal union.

Mongolism implies arrest of natural growth, with abnormal growth of cranium and facial bones depression of nasal bridge open fontanels thickened tongue, defective sexual development, and notable mental abnormalities apathy somnolence and later a perfectly unreasoning bodily activity The eyelids assume an oblique angle the skin shows few if any changes The bones develop naturally The thyroid is usually normal, and thyroid feeding is of no benefit. Alt and Schüller believe mongolism to be in fact a primary dysgenitalism.

THE PARATHYROIDS

Only within late years have these four little bodies been given their proper consideration and in this short time have attained an importance in pathology quite disproportionate to and in inverse ratio with their size It is now generally believed that nearly all cases of tetany in man are of parathyroidal origin and due to defective function and consequent evidences of hypoparathyroidism. Even that form of tetany occurring in the puerperal state is to be explained in the same way in fact it would appear that pregnancy may provoke an outbreak of this kind or of a condition previously latent. It is now well known that the tetany of infants is often due to hæmorrhages, i e apoplexies into these little bodies Tetany of so called gastrointestinal origin is difficult to explain, but must be due to a suppression of parathyroidal activity due to some toxic products elsewhere produced

It is of interest that Fleischmann found that among those who had had an earlier history of infantile tetany the teeth showed a marked defect in their protective enamel covering It is known also that the parathyroids succumb easily to tubercular infec

tion hence, perhaps the frequency with which the Chvostek phenomenon i.e. facial spasm from a tap on the outside of the face, may be produced in tubercular patients.

THE THYMUS

The thymus seems to have much to do with the development of the entire bony system when its activity is reduced ossification is much interfered with and proceeds irregularly and from scattered points. Sometimes it fails utterly as when the first pair of ribs fail to ossify and the others are left weak and subject to early deformity When this happens the sternum is usually disproportionately wide the bones all lack in mineral constituents and become so soft that they may even be cut with the scissors later this softness and flexibility may give way to fragility and brittleness. The larger epiphyses (hip and knee) may still be cartilaginous when the shafts are already brittle. In animals thymectomy produces osteomalacia, as well as an osteo-arthritis much like that met with in rheumatism or tabes The hair undergoes changes and becomes either very soft and downy (hypertrichosis lanuginosa) or the reverse, i e stiff and bristly Corresponding defects in dentition occur the teeth being really epithelial products as well as the hair There are other accompanying congenital defects such as rudimentary uterus mammæ etc.

Peculiar relations obtain between the thymus and the genital glands, since it persists much longer after castration while its removal is often followed by a hypertrophy of the external genitals Redlich's case of infantile gigantism had this peculiarity

The thymus seems intimately concerned in the production of the *status lymphaticus* and the so-called *thymic asthma* in which conditions along with hyperplasia of the thymus itself goes an accompanying participation of the entire lymphatic system including the tonsils, the follicles of the tongue stomach intestine and spleen which are all lymphoid structures while the bone marrow becomes very red In these cases there is defective development of the genital system The entire chromaffin system seems to suffer from hypoplasia, as shown by low blood pressure due to defective adrenalin secretion

The relations of the thymus to the conditions known as achondroplasia seem very positive though not very distinct. This condition is one of irregular dwarfism in twelve cases of which Jensen found the hypophysis reduced in size. The explanation would include in general those dwarfs who in time past have been made court jesters or court fools, and have played no small part in history It is a curious fact that the ancient Egyptian deity Ptah is represented as a dwarf with crooked legs. The term achondroplasia was devised by Parrot who in 1876 was perhaps the first to ascribe to it an identity of its own. It may moreover include such defects or deformities at the base of the skull as to stand in relation with changes in the hypophysis

Cranial defects are common and spinal curvatures may often accompany the condition. When an infant dwarf is raised by lifting it under the arms it usually cannot be made to sit up the relatively large head cannot be maintained in proper position and the efforts usually made to prop it up result in these curvatures.

Basal pressure between the second and eighth weeks of fœtal life affords a tempting explanation for some authors. This may be effective, either within or without the skull, or may be made so by the almost doubled-up position of the fœtus *in utero* or it may occur within the amnion from hydramnios — in other words, from lack of space accommodation Whatever deformity is produced by participation of the amnion occurs within the first six or eight weeks of intra uterine life Amniotic pressure may produce deformities purely mechanical, or by a disturbance in the very early stage of bone formation. Jensen believes also that narrowing or limitation of the amnion is a factor transmitted by heredity in many families and that numerous teratomata are ascribable to this influence.

Naturally when pressure is made cartilaginous structures suffer most and its effects may be seen for example in the very flat

noses of some new-born infants, also in hare lip, micrognathy and agnathy hydrocephalus, etc. as well as in defects of the thyroid and thymus as the sheer result of pressure, the order of phenomena being about as follows Increased amniotic pressure deformity of the embryo pressure effects upon the hypophysis, thyroid, and thymus, and consequent disturbance of their functions and perversion of their secretions.

Both Hochenegg and Kocher have reported most illustrative cases showing how after removal of the anterior hypophysis, there is reduction in dimensions, the hands and feet rapidly becoming notably smaller If achondroplasic dwarfism were due to over activity of the hypophysis the cranium would show overgrowth as do the long bones and the lower jaw but this condition does not appear until after birth moreover in acromegaly and gigantism the sexual instinct is lowered or lost as it is not in achondroplasia — rather the contrary By these facts, then we may the better decide as between responsibility of one gland or the other

Jensen regards it as probable that the future will demonstrate that these changes in the jaws hydrocephalus, harelip and the expressions of athyroidism and athymism are due to abnormal curvature of the embryo owing to a diminished amniotic space that the gas cysts formed in these inner organs are due to increased hydrostatic pressure and that adiposity and increased sexual activity are to be ascribed to the secondary and indirect pressure effects of such displacement by which the posterior hypophysis is affected.

Summing up the conditions ascribable to amniotic pressure, we have first to appreciate that the overstretched amnion is capable of causing pressure on its contained embryo sufficient to affect its secretion and influence its shape and position, even to a degree permitting important alteration in many respects, and that by diminishing blood supply a general dwarfing may be produced. Individual peculiarities of each case will determine its prominent features but cartilage and bone both suffer early and seriously while in consequence thereof alterations are manifested in the viscera and in the ductless glands. The achondroplasiac is therefore an amniotic dwarf so conditioned during the earliest weeks of its amniotic life and there is scarcely a limit to the abnormalities and effects which may result therefrom.

Curvilinear compression, then due to such pressure, predetermines the deformities, internal and external, of the achondroplasiac, the extent of which is a measure of the time and extent when and to which pressure was first made while teratomata are but extreme manifestations of the same kind.

Thymus and Thyroid

Increasing attention is being paid to the interrelations of these two bodies in that symptom-complex known as exophthalmic goiter The more closely we study it clinically the more composite seem its features and the more interchangeable at least in some respects. In fact, so sharply are the German pathologists differentiating between the two that they speak now of Basedow-thyroid and Basedow thymus. Undesirable as are these terms to us, it may be that we shall have to accept them until better English equivalents are offered. Certain it is that undue activity of one seems to excite the other the reverse being equally true

The effect on animals of the injection of their juices or transplantation of their tissues is much the same Godernatsch, in certain feeding experiments fed one set of animals with thyroid and another with thymus, with the former he produced dwarfing with the latter the contrary but the former could be overcome by thymus feeding It is found in man that the mildest type is that in which apparently only one organ is involved while extirpation of either one alone leads to a reduction in the degree of symptoms of either type along with a reduced lymphocytosis. It would therefore be tempting to regard each organ as having its own secretion, with its own distinct type were it not for the effects of adrenalin which seem to indicate quite the reverse and to disprove their completely separat character Moreover their embryology would argue against their complete separation. Anatomically the cylinder cells

of the thyroid are regarded as concerned with the sympathetic system and the polymorphous cells as evidencing the vagus capacity of their component tissues. Tandler and Gross have observed persistence of the thymus among the Skoptsy while others have noted increase of development of the genital glands after thymectomy

Again, between the thymus and the entire chromaffin system including the adrenals, there exists a marked interrelation since with insufficiency of the latter as in Addison's disease, goes increase in size and activity of the thymus.

The *adrenalin test* is applicable to all cases in which it is desirable to make it. It is necessary before making it to determine the clinical intensity of the symptoms, the blood picture, and the renal elimination as to glycosuria and polyuria and the relation of the latter to perspiration specific gravity etc since according to Saardermann, the more intense the symptoms the more pronounced are the reactions He advises to inject 0 001 of adrenalin, in two sittings, at intervals of one half hour although to some this would appear heavy dosage In struma simplex with one half of the patients at least, there will be no reaction and no glycosuria In all cases perspiration will cease while only rarely is there subjective sensation of heat In patients not above 20 if sugar be present at all it is so in but slight amount At ages from 20 to 40 there is usually some trifling polyuria, and with it perhaps a small percentage of sugar After 40 the test is less distinctive, and there is diminution in one or the other or both or both may be lacking

In exophthalmic goiter adrenalin causes more marked perspiration with palpitation and tremors. When glycosuria and polyuria as well as perspiration are greatly increased then we may regard the sympathetic system as overloaded while reduced perspiration indicates a much milder form When perspiration is entirely lacking, and the skin is dry it shows that the pneumogastric is overworked. In the latter group of cases lymphocytosis is diminished sometimes even within a few hours after the adrenalin is given

Zeitschr f exp. Therap Path., xxi, Heft

THE ADRENALS AND THE CHROMAFFIN SYSTEM

These are the only members of the ductless gland system which have not to some extent at least been considered as quite legitimate field for surgical endeavor the instances of attack upon these bodies being very rare, and under peculiar pathological conditions such as are seldom duplicated Nevertheless their reciprocal interrelations with the other ductless glands are just as interesting and just as important. When the adrenals are removed in rabbits the hypophysis enlarges their medullary portion is the most vital and its hormone enters the blood via the suprarenal veins. This secretion preserves the tonus or equilibrium of the nerve-centers of the heart and blood vessels, as well as of all the respiratory muscles — possibly indeed, of the entire muscular system.

The cortex belongs, properly speaking to the chromaffin system and is capable of assuming at least to a small extent, the work of the medullary portion, while after removal of the latter it undergoes hypertrophy Adrenal insufficiency causes asthenia, apathy muscular atrophy and finally paralysis, shortly prior to death. It causes also pigmentation. In some roundabout way it may lead to hydrocephalus internus, since in five cases of this condition Czerny could find no medullary substance.

Insufficiency may be produced in consequence of acquired or congenital atrophy hypoplasia, and cirrhosis, or it may on the other hand, be the result of local tuberculosis, syphilis or tumors No matter what the active cause pigmentation is always an accompaniment and serves to differentiate diseased conditions

The pigmentation noted during or after pregnancy as seen along the linea alba and at the umbilicus, labia, nipples, face and chloasma uterinum, as well as increased growth of hair even formation of a beard are to be ascribed to the adrenals. Sometimes the excess of hair is lost after delivery Halban demonstrated much the same thing in animal after shaving their abdomens he ascribes this to the adrenals, which he found to enlarge during pregnancy

THE VEGETATIVE SYSTEM

This is a term now in quite general use, comprising what we used to call the sympathetic and possibly the trophic nerve systems. It was introduced by Kundrat. Disturbance of this vegetative system implies developmental retardation not directly ascribable to primary lesions in the ductless glands.

The term *vegetative* includes also the visceral nervous system the ganglionary and autonomous system and the three great plexuses which Gaskell has described as the cranio-cervical, the thoracic-columnal, and the sacral along with Auerbach's and Meissner's ganglia and the fibers which they receive from the other system and from the anterior roots after they leave the spinal cord. This system supplies all the glands having ducts, as well as all the involuntary muscles and the muscular organs, including the heart bronchi alimentary canal gall-bladder and ducts, bladder and ureters, the pelvic organs the small hair muscles, and the blood vessels. These ganglia have been happily spoken of as switch-boards and some of the nerves pass through two or three of them. It includes also the oculomotor chorda tympani, the vagus and the pelvic nerves, which as a group have been called the *vagus group*. It should perhaps be emphasized that the sympathetic and the vagus groups are more or less antagonistic. The tendency to-day is to look more to this so-called vegetative system and the hormones and less to the trophic nerves for explanation of various phenomena under present consideration.

The entire chromaffin system and especially the medullary part of the adrenals is under control of this system, and bits of chromaffin tissue are scattered throughout the sympathetic nerves. The actual material secreted by this system no matter where found is adrenalin. After extreme muscular activity the chromaffin cells lose for a time their chromaffinity. In other words their adrenalin is consumed (Schur and Wiesel) and the amount of adrenalin in the blood serum is increased. This means that during their activity a large amount of glycogen is used, melted down that is, the mobilization of glycogen is governed by the chromaffin system.

Pluriglandular Disease

Under the term pluriglandular implying obviously the participation of two or more of the ductless glands in the etiology of a given morbid condition, the French especially have introduced a term which is convenient, and yet fraught with some danger — danger that is to our clearer comprehension of the nature of the diseases under consideration. Yet underlying this danger is a generalization of truth and fact which, in order to avoid one needs a candid statement of the other.

This basal fact is that the ductless glands actually are so complex in purpose and function, and their interrelations so complicated, that in many instances, in order to identify the organ primarily at fault, we are in sore need of much more accurate knowledge of function as well as an earlier study of cases, than is usually permitted us. Many of these cases wander from family physician to specialist, and then back again the former is perhaps too concerned with the general fact that the patient is really sick, while the latter interrogates mainly the particular organ in which he is especially interested. Thus by the time the patient comes under observation of the really competent universal specialist the clinical picture is so diversified that a proper location of the primary fault is well-nigh impossible. It is the old story

The centipede was happy till one day the toad, in fun,
Said, "Pray which leg comes after which?"
This excited him to such a pitch
He lay quite helpless in the ditch
Not knowing how to run.

Once the habit is formed of simply recognizing a pluriglandular disorder as such all scientific accuracy is put aside, and therapeutic efforts assume an experimental or empiric character which impairs rational and well directed effort. Whatever then, of benefit accrues from such treatment, while welcome is not conducive to accurate advice. Let us, then, acknowledge that while disturbances of really pluriglandular type occur not infrequently we must yet make effort to trace symptoms to their primary i. e. their real, source.

Falta's definition or description of what should be the real nature of a general condition entitled to this designation is well founded and should be generally accepted. By this term he would imply a condition due usually and originally to an infection which may or may not be traceable, involving almost simultaneously more than one of the ductless gland system, leading to well-marked atrophy usually of the sclerotic type, and without apparent reason for such selection. In this possible involvement the thyroid, hypophysis, adrenals, and the genital glands usually figure, and we accordingly find evidences of thyroidal and pituitary insufficience, sexual impairment, combined perhaps with symptoms reminding one of Addison's disease such as debility pigmentation, and the like. Most conspicuous and almost universal is cachexia, pronounced but of ill-defined type.

The infection underlying this vicious circle may be of various types. Gonorrhœa and syphilis are perhaps no more likely to be followed by the condition than typhoid influenza, or tuberculosis in fact the latter figure prominently Too often one of these has preceded the other so that accurate history is impossible to secure. Claude and Gougerot have gone so far as to postulate a congenital or inherited weakness of the entire gland system as a contributing cause, or as so reducing resistance that a comparatively trifling temporary or short lived infection may easily result all of which is self-evident. Alcoholism may also be mentioned in this connection.

Gilford's and Jonathan Hutchinson's *progeria* and Variot's *senile nanism* are types which pluriglandular disease may produce. These writers both describe cases remarkably similar in their diminutive stature extreme emaciation, thin, wrinkled, and almost folded skin, small lower jaw slender bones with premature ossification, clubbed bone ends, and congenital retardation. Gilford ascribed the trouble to the hypophysis, Variet to the adrenals. But, as Falta shows, the premature ossification may have been due to a separate cause their normal mentality speaks for thyroid insufficiency while the infantile distribution of hair may have been due to adrenal insufficiency or even to mere atrophy of the skin.

In all this consideration we must not forget that the ductless glands may have been congenitally defective, and that we must not always ascribe all secondary changes to their perverted secretions.

As Gilford[1] says, By experimental study alone we are lost in the mazes of abstract science, while by clinical research alone we arrive at premature and unscientific conclusions. In his opinion we must turn to pathology and study what happens when one or another is diseased. Initial correlations are established with the first penetration of the ovum by the spermatozoon and continue until the ductless gland system is elaborated. He is compelled (and probably we, too) to assume some faculty of adjustment and subsequent correlation quite apart from either that system or nerve influence. What constitutes the machinery or mechanism of this later regulation is one of our greatest problems.

Osteomalacia

Osteomalacia is a disease evidently due to disturbed internal secretions which at the same time cannot be placed in any particular category because of our still defective knowledge. It occurs mostly in women and appears to be due to excess of ovarian hormones, since it is relieved, improved, or even cured by castration. One puerperal or post puerperal attack seems protective as against others during subsequent pregnancies. When occurring during pregnancy castration can be performed without necessarily disturbing it.

It occurs also in connection with Graves disease, and even along with it and tetany combined Cases have been reported where the symptoms of Graves disease have changed into those of myxœdema, and later again into a puerperal osteomalacia. In this condition the glycosuria, etc. produced by administering adrenalin, and even its effects upon the heart and vessels, are much less pronounced

[1] Gilford, "The Disorders of Post-Natal Growth and Development," 1908, London.

Lancet, London, 1913, Sept. 6

than in other conditions, conspicuously less during pregnancy As also showing the pluriglandular nature of the condition, certain cases have been improved by the injection of pituitary extract.

Osteomalacia is quite different from rickets in that it occurs sometimes in endemic form, appears only in adults, and is not painful. The so-called rheumatic or rheumatoid form is a misnomer

Chlorosis

Chlorosis is also a disease, probably of pluriglandular nature, which begins usually at puberty We naturally seek for its cause in disturbed activity usually reduced of the sexual glands, while participation of the other glands, thyroid, chromaffin system, and the bone marrow is a secondary feature.

THE MAMMARY GLANDS

The question whether the mammary glands have an internal secretion of their own is as yet undecided, but will furnish at least a reason for their mention here

There are four periods of mammary activity

The eighth or ninth month of fœtal life
Period of puberty
Menstrual period or the day before it,
Pregnancy

For all but the last of these the ovary furnishes the impetus.

As between the ovaries and the mammæ there obtains very intimate sympathy This is a matter of daily experience among women, but is noted in disease conditions, for instance, the fact that actual ovarian disease disturbs the mammary function and activity and that Starling obtained a cactostabile substance from the ovaries which when injected into non-pregnant animals, caused enlargement of the mammæ and even lactation Moreover menstruation often causes sufficient mammary activity to lead to secretion of colostrum previous to the period and even of milk after it, while there is sufficient trophic activity at puberty to produce very significant development of gland elements

While pregnancy naturally gives the greatest impulse to the breasts, it is not necessary here to invoke the ovaries, since there are a number of cases on record where castration shortly after conception has not prevented enlargement and lactation.[1] Furthermore, transplanted breasts have yielded milk.

Milk formation goes with the termination of pregnancy even with miscarriage whether premature or at term. Consequently some have held that the fœtus itself furnishes the hormone which stimulates lactation (Starling, Biedl, Foa) while others ascribe it to the chorion epithelium (Halban) since the death of the fœtus does not interfere with the act, but when the placenta dies no milk is produced.

It was a full appreciation of this interrelation which led Beatson to the suggestion of removal of the ovaries in inoperable cancer of the breast, and which has led others to the suggestion of removal of the breasts in order to limit ovarian activity in some extreme cases. A few trials of Beatson's suggestion have led me to believe that it may occasionally be of value.

THE TONSILS

The tonsils have recently been alluded to as "lymphoid structures with a short period of usefulness." These little bodies are not fully developed until the end of the first year and have a natural tendency to disappear by the end of the seventh, which, however in our climate does not often occur George Wright has also shown that the periods of greatest tonsillar activity coincide with the periods of molar dentition, i e second, sixth, twelfth, and seventeenth years at which last age the "wisdom teeth are making their appearance. But there may be other reasons for this aside from the conclusion which Wright seems to draw While the lymph flow seems to be outward and while it carries an unusually large proportion of lymphocytes, the same interstices through which they escape afford lodgment for bacteria, which latter are not by any means all destroyed by the lymphocytes, acting as phagocytes, even if they can so act, which some deny Assuming the correctness of the view that tonsillar inflammations are caused rather by their toxins than by the bacteria

[1] Münchner Doppelmut. Ovarium bei Schwangeren. Münchner med. Wochenschr. 1894, p. 1117
Fränkel. Arch. Gyn. 1914, March

themselves, the tonsillar crypts certainly offer ideal foci for infection. Schönemann painted one side of the fauces with coloring matter and found that the pigment passed quickly into the tissue of the tonsil. He considers the tonsil to be a genuine lymph gland, i.e., like other lymphoid tissue. Good and Sheedy have suggested that the crypts are practically culture tubes in which are carried those bacterial growths by which a protective immunization is afforded.

The tonsils have been characterized as the "sentinels of the body" but are scarcely more protective than is the schneiderian membrane. While they are frequently ports of entry they are doubtless a part as well of our protective mechanism. Their hypertrophy is by no means confined to the frail and puny but is fully as often seen in the robust.

Their real function, be it what it may, pertains to early rather than to later life. Whether they have an internal secretion or not they are really disturbed by secretions produced elsewhere and belonging as they do to the inflammable almost tinder like lymphoid tissue of the body a collar of which surrounds every vestigial or embryonic canal, they succumb so easily to infection that they reinforce toxins or hormones produced elsewhere even though they produce none themselves while they cause such active and violent participation of other tissues, and they so seriously incommode the patient that they deserve brief mention here whether they are actually ductless glands or not.

In conclusion, it will be of advantage to make two brief lists, one illustrating conditions pertaining to the ductless glands in which operation may be considered and another illustrative of operations which these considerations may require.

CONDITIONS WHICH MAY REQUIRE SURGICAL INTERVENTION

Thyroid — Extirpation, which must be partial, save when dealing with malignant disease; ligation of blood vessels; transplantation or grafting.

Parathyroids — Here we can scarcely do more than transplanting.

Thymus — Extirpation or transplantation.

Adrenals — Transplantation, or possibly extirpation of one.

Cachexia strumipriva — Has been relieved by transplantation.

Hypophysis — The anterior lobe may be incompletely removed; very rarely is complete extirpation practicable; transplantation has been attempted, so far with questionable success.

Genital glands — May be removed for various causes, but removal is rarely demanded for conditions under present consideration.

Breasts and the *tonsils* — Removal.

OPERATIONS WHICH MAY BE REQUIRED

In general, the character of the operations called for under the various conditions above mentioned include,

Transplantations (thyroid, thymus, adrenal, genital)

Craniectomy and decompression, for consequences of ctual synostosis, and consequent microcephaly etc.

Operations for hydrocephalus

Operations on the spine and limbs for various deformities

Thyroidectomy and ligation of thyroidal vessels

Thymectomy and operations required by pressure upon the trachea (tracheotomy)

Operations for consequences of osteomalacia, achondroplasia, etc., involving the pelvis (cæsarean section, etc.)

Operations on the teeth and jaws for various congenital defects, cleft palat etc.

It will be seen, then, that perversion of the internal secretions may produce, directly or indirectly consequential results which call for a very large and varied list of operations, in the performance of which the surgeon will be required to possess a degree of ability and skillful technique which may tax the resources of the best of us. It is a full appreciation of this fact that really led me into this study and made me feel that the general subject was one worthy of the attention of the physiologist and pathologist working in conjunction with the surgeon, but better yet the well equipped surgeon should be a good pathologist and physiologist as well as a surgeon.

SPASTIC TUMOR OF THE PYLORIC CANAL AND OTHER SPASTIC CONDITIONS OF THE STOMACH THEIR SURGICAL TREATMENT[1]

By WILHELM LERCHE, M. D., St. Paul, Minnesota

As pointed out by Erik Müller (1) considerable confusion exists because the various anatomists have differed in their descriptions of the stomach and in the application of the names to the various parts of the organ. This is particularly the case with the pyloric end. A brief review is therefore necessary in order to explain the terms used.

The stomach was first considered a simple sac with an orifice of entrance and an orifice of exit.

To Willis (2) in 1681 is due the first description of the antrum pylori. He described it somewhat vaguely as an antrum *longum et caput* on the right side of the stomach, ending in a small orifice, the pylorus.

Cruveilhier (3) in 1834 gave the following description About one inch from the pylorus the stomach, bending sharply upon itself forms a pronounced elbow (*coude de l'estomac*) and presents an ampulla which corresponds to an interior hollowing called by Willis the pyloric antrum by others the small cul-de sac or small tuberosity of the stomach.

Retzius (4) in 1857 found that the antrum did not have the same shape in all bodies he mentioned three different forms. The antrum as depicted by him comprises the vestibule and the pyloric canal, which will be further discussed in this paper Retzius also observed that in the newborn the part of the antrum next to the pylorus formed a short cylindrical tube about 1 cm. long

Luschka (5) 1863 in his description of the antrum indicates that by this he meant a very small part of the stomach next to the pyloric orifice Jonnesco (6) thinks that he confounded the antrum with the pyloric canal.

Gegenbaur (7) 1883 described it as a faint bulging on the greater curvature, which on considerable distention shows the antrum pylori.

Jonnesco (6) divided the stomach into (*a*) the fundus, whose lower limit is represented by a horizontal plane passing through the superior border of the cardia (*b*) the pyloric part forming the inferior horizontal portion of the organ, its left limit being indicated on the lesser curvature by a notch marking the flexion of the stomach, and on the greater curvature by the latter's change in direction. He subdivided the pyloric part into the vestibule and the pyloric canal

The pyloric vestibule is the small cul-de sac interposed between the body of the stomach and the pyloric canal. The pyloric canal first described by Jonnesco (8) in 1895 is the cylindrical part 3 cm. long between the pyloric vestibule and the pyloric orifice.

(*c*) The body of the stomach, or the vertical portion, is between the fundus and the pyloric vestibule.

Erik Muller (loc. cit.) studying the foetal stomach, found the pyloric canal described by Jonnesco always present, and he adopted the latter's description and nomenclature of the pyloric part.

Cunningham (9) agreeing with Jonnesco and Müller said that there is no part of the stomach which is more definite and distinct than the pyloric canal, and although it may be somewhat indistinct in adults, it can always be recognized. Its musculature is thicker than that of any other part of the stomach.

His (10) and Froriep (11) accepted the division of the pyloric part after Jonnesco and Muller but His also proposed a nomenclature of his own.

Forsell (12) suggested the name "canalis egestorius" for the pyloric canal "sinus instead of the vestibule, and fornix for fundus. He described the canal as being 3 to 5 cm long

Beckey (13) found the length of the canal in adults varying from 2 5 cm. to 5.5 cm. he does not consider the pyloric canal a fixed anatomical structure but a contraction phenomenon. Wernstedt (14) seems to take a similar view

Fig 1 shows an inflated specimen of a stomach that I removed from a woman 26

[1] Read in part before Minnesota Psychological Society March 18 1913, and in part before Ramsey County Medical Society May 27 1913

years old, in which the type of a pyloric canal described by Jonnesco-Müller Cunningham is very well represented. A section through the pyloric part of this in the plane of the two curvatures is shown in Fig. 2

The stomach walls are made up of three coats — the mucosa with the submucosa, the muscular and the serous. The muscular coat consists of three layers — the outer longitudinal (thickest along the curvatures, especially at the lesser) the circular layer and the inner oblique layer The peculiar arrangement of the oblique layer is illustrated in the schemes of Forsell (15) (Figs. 3 4 and 5) The latter found by dissection of the muscular layers and from his X ray studies on the movements of the stomach in healthy persons that a constant and definite muscular architecture determines the characteristic contractions of the organ. According to Forsell the corpus or body of the stomach corresponds to the part between the upper and lower segment slings, as depicted in his diagrams.

Rüdinger (16) found that only the most superficial fibers of the longitudinal muscular layer are continuous with those of the duodenum while the deeper ones in bundles dip down between the circular fibers of the sphincter pylori, forming arches. They constitute one-third of the thickness of the sphincter and were called by Rudinger the "dilatator pylori. The balance of the sphincter is made up of circular fibers forming the "constrictor pylori. There is no continuation between the circular fibers of the pylorus and those of the duodenum, there being a connective tissue septum between them.

Retzius-Gyllenskoeld (17) described a groove or channel along the inside of the lesser curvature of the stomach, which forms by the contraction of the oblique muscular fibers, and through which Retzius thought that saliva and fluids taken by mouth would pass directly from the œsophagus into the pyloric vestibule.

More recently this has been studied by Kaufmann (18) Waldeyer (19) and Lewis (20) Kaufmann observed the canal at post mortem in the human body and produced it on dogs by injection of physostigmin (Fig 6)

Hasse and Strecker (21) have described folds of the gastric walls corresponding to the canal of Retzius.

Movements of the Stomach

Wepfer[1] (1679) was the first to study the gastric peristalsis in vivisected animals. He also noticed occasional deep constrictions near the middle of the stomach. Similar observations were made by Schwartz, and later by Haller Home (23) considered the deep constriction dividing the stomach into a pyloric and a cardiac portion a normal condition during digestion.

Magendie (24) found that the cardiac part acted as a reservoir holding the food and gradually forcing it into the pyloric part where the chyme formation took place.

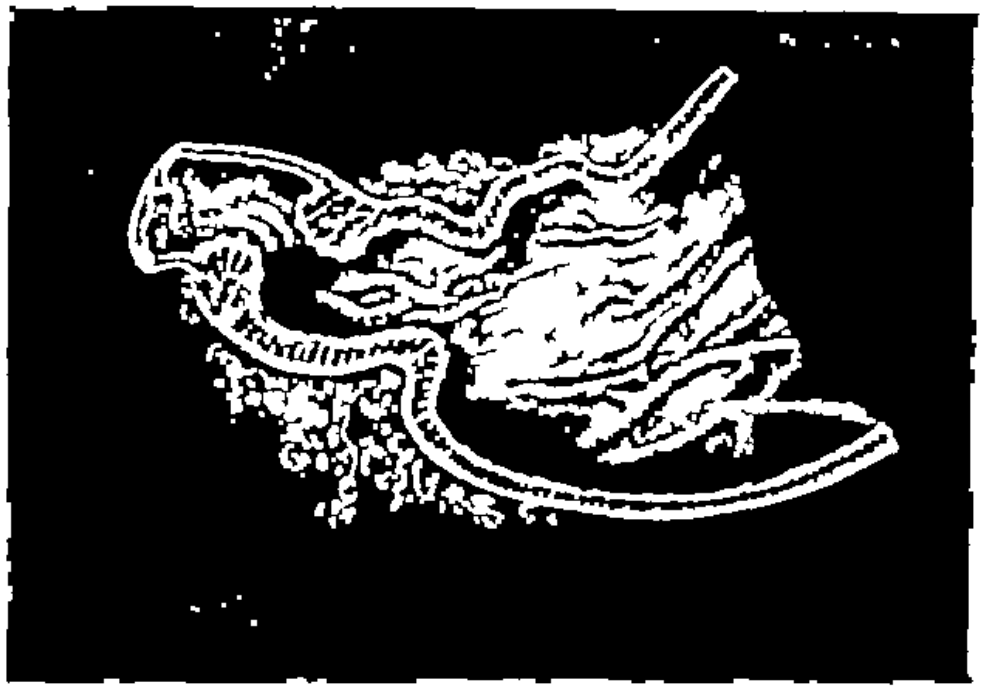
Beaumont (25) between the years of 1825 and 1832 made numerous experiments on Alexis St. Martin, who had a gastric fistula from an accidental gunshot wound. Some of his conclusions were as follows In health and when free from food the stomach is usually entirely empty and contracted upon itself. The food first passes to the left and then along the greater curvature from left to right to the pyloric end, then returns in the course of the smaller curvature and repeats these revolutions, the whole contents being constantly mixed.

He observed the contraction of the transverse band, situated three to four inches from the pyloric end by introducing a long thermometer toward the pyloric part during the latter stages of digestion. The constriction would relax and the thermometer was drawn toward the pyloric end as by suction and again forced back. Some of these observations were confirmed by Hofmeister and Schutz (26) who studied the movements on freshly removed stomachs of dogs suspended in a moist chamber at body temperature

Rossbach (27) studying the peristalsis in dogs in morphine narcosis through the open abdomen, could not verify the rotating motions described by Beaumont.

Openchowski (28) observed the constriction of the stomach in animals during the act of vomiting

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Section through the pyloric canal and the pylorie vestibule of the stomach of woman 26 years old in the plane of the two curvatures See Fig T 0-thirds natural size

With the introduction of the X rays in the study of the gastro intestinal movements observations could be made under more nor



Fig 1 G duodenum H, pyloric canal, V, pyloric vestibule B, body of the stomach C fundus D incisura cardiaca (His) E, oesophagus, F incisura angularis (His) I, sulcus intermedius

mal conditions, and the incorrectness of some of the earlier views became evident.

The first results of such X-ray investigations (on cats) were announced by Cannon (22) in May 1897 and independently by Roux and Balthazard (29) in June and July 1897 The latter experimented on frogs, dogs, and man.

With the introduction of the large bismuth meal of Rieder (30) in 1904, it became possible to make more exact studies of the gastric movements in man.

Cannon (31) has found that after an ordinary full meal to which was added bismuth

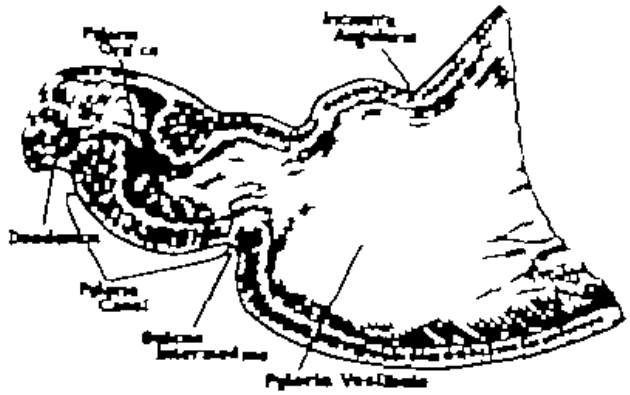


Fig Section through the pylorie end of the stomach of woman 26 years old in the plane of the two curvatures

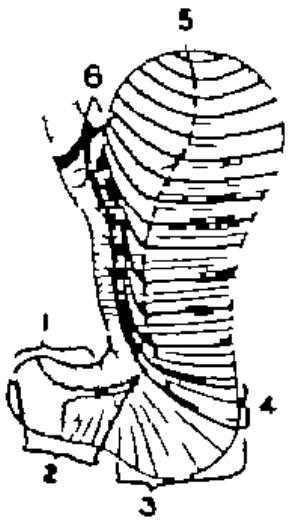


Fig 3

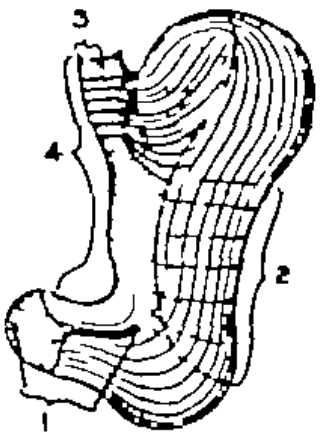


Fig 4

Fig 3 Diagram of the circular and oblique lay 1, circular musculature of the pyloric canal ligamentum ventriculi, 3, fan shaped musculature of pyloric vestibule 4, lower segmenta sling 5 line of invert on of the oblique musculature 6, supporting sling Inner lines circular muscle (after Tornell) Hen 3 lines oblique muscle

Fig 4 Diagram of the longitudinal muscular layer of the stomach (after Tornell) ligamentum cutaneum 2, body of the stomach 3, median longitudinal bundle 4, median longitudinal bundle Obl que mu k f the corpus dotted lines

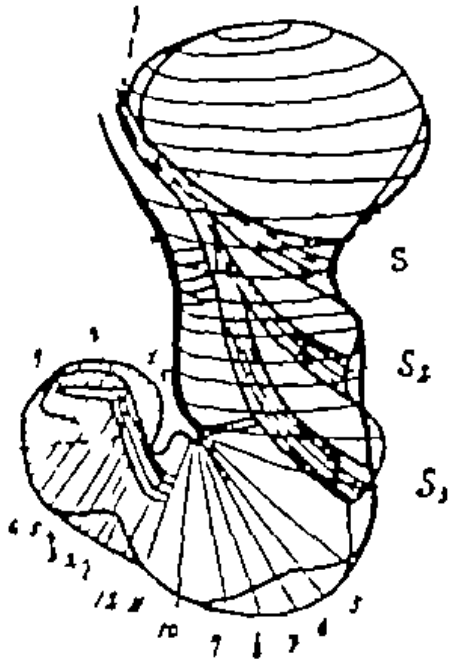


Fig 5 Scheme showing the modus operandi of some of the muscle fibers (after Tornell)

ubstrate a slight annular constricti n short ly appears near the beginning of the vestibule which moves slowly toward the pylorus and later similarly moving constri tion appear near the middle of the stomach The wa es become deeper on the vestibule The food i held quietly without being mixed in the cardiac part where the su fa e l y r of food comes in contact with the acid-secreting walls The ptyalin digestion may thus go on in the center for an hour or more There is no peri tals on the cardiac end of the stomach but thi part gradually contracts upon its ontent pressing the acidified layer into the a ti e pyloric part where in the vestibule it is churned and thoroughly mixed with the gastric secretions by the deep peristaltic waves until the chyme is ready to be expelled into the duodenum (Fig 7) Acid is not secreted in the pyloric part while pepsin is The con



Fig 6 Interior view of sulcus salivalis of Retzius in contracted stomach of dog (after Kaufmann)



Fig (After Cannon)



Fig 8 Superimposed t elve phases of single contraction of normal stomach in man (after Kuestle Rieder and Rosenthal)

tents of the vestibule is expelled at intervals depending upon the condition of the chyme and the acidity on both sides of the pylorus.

The pylorus obeys the so-called law of the intestines" the acid when above causes a relaxation of the sphincter which is below and the acid when below causes a contraction of the sphincter which is above

Kaestle, Rieder and Rosenthal (32) succeeded in taking series of instantaneous radiographs of the movements of the stomach in man They hold the same view as Cannon that normally during digestion, there is no complete separation by a contracting transverse band between the pyloric portion and the rest of the stomach, as maintained by the older physiologists (Fig 8)

Hertz (33) says that in his X-ray work he has several times seen complete separation, and likewise Kaufmann and Holzknecht (92)

In vomiting the complete contraction has been observed by Cannon. The experiments of Cannon were mainly conducted on animals The question as to the movements of the human stomach has not been definitely settled yet.

In a recent work Groedel (34) who himself has made extensive investigation says that there has not yet been sufficient time to arrive at definite conclusions.

ETIOLOGY

Cruveilhier (35) gave a good description of functional pyloric stenosis and he related a case observed by him in 1822 in which the pylorus was found perfectly normal at post mortem

It was due to the teaching of Kussmaul (36–37) however that the importance of the spastic disturbances of the motility of the stomach secondary to organic lesions became better known, and a number of cases have been reported since then. Doyen (38) Carle and Fantino (39) Schirokauer (40) and others have reported such cases operated upon

The importance of this has been particularly evident of late, since Haudek (41) by his X-ray work was able to show that almost every case of florid gastric ulcer was accompanied by disturbance of motility due to spasm of the pylorus. The pyloric end, the cardia and the body of the stomach are the parts most frequently affected by spastic contraction.

Gastrospasm, in which the entire organ participates, is said to exist, but Langemak (42) found no case reported up to 1902 Waldvogel (43) on the other hand thinks gastrospasm a rather frequent occurrence and Schwarz (44) has recently demonstrated gastrospasm in two cases by the aid of the X rays. Boas (45) has described, under the name "Magensteifung" spasm of the body of the stomach.

Spastic contraction of the pyloric end is said to be reflexly caused by ulcer erosion cicatrix, adhesions, new growth, inflammation hyperacidity stagnation of food, foreign body and the Landerer Maier (46) type of congenital pyloric stenosis.

Spasm due to primary motor neurosis has been denied by some but on the other hand it has been argued that if the existence of pyloric insufficiency is admitted, idiopathic spasm of the pylorus should also be. Furthermore there is no question that we have an analogous condition in the cardiac end of the oesophagus — the so-called cardiospasm

Riegel (47) says that before we are justified in considering the spasm of the pylorus as a genuine primary motor neurosis we must be able to exclude all perversions of gastric secretion mechanical obstacles in the pyloric region all adhesions, cicatrices, etc.

C Spastic tumor of the pyloric canal. Resection. Billroth and Farmer wife, aged 50 five children She was operated upon for vesico-vaginal fistula and cervical laceration five years previous to the onset of the present trouble, had had fever for three seasons has complained of ache in the small of the back for year For three months the patient had had a burning sensation and rumbling in the stomach, with dull ache and sharp pains shooting to the back and down the sides of the abdomen. She had noticed lump in the epigastrium

Examination Heart and lungs normal, upper pole of right kidney palpable uterus retroverted hemorrhoids. The abdominal walls were thin and somewhat above the umbilicus was seen prominence which measured about 6 cm by 4 cm The tumor was hard and somewhat irregular and not very sensitive Gas could be felt bubbling through it It was perfectly movable On inflating the stomach with air the tumor slipped to the right of the median and the greater curvature was about 2–3 fingerbreadths below the umbilicus Gastric peri-

stabis was seen. There had been no vomiting. No dilatation. Fasting stomach, empty After test meal, 75 ccm. acid to litmus no congo-reaction. The tumor was examined and measured several days in succession and it was always present and of the same size contour and consistency Repeated test-meals showed absence of hydrochloric acid.

Diagnosis. Tumor of pylorus, most likely carcinoma.

Laparotomy The tumor which measured about 4 by 3 cm. and was hard as cartilage, disappeared while being examined A thickening remained in the upper wall near the pylorus, which was patent, and resection of the stomach with posterior gastro-enterostomy was made.

The patient made a prompt recovery and has had no trouble with her stomach since the operation, which was performed three years ago

Examination of the specimen showed that even the thickening in the upper part of the wall had disappeared and there is no scar ulceration, or tumefaction it appears to be perfectly normal (Fig 9) The part involved by the spastic tumor was the pyloric canal. The pylorus itself was unaffected

Few cases of the spastic tumor of the pyloric end in the adult have been reported. Poensgen (48) who examined the literature from the earliest times down to 1882 on the question "the motor functions of the stomach and their disturbances, even doubted that such a tumor could be possible. In infants however a number of cases have been reported since Hirschsprung (49) in 1887 demonstrated specimens and described cases under the name congenital stenosis of the pylorus. Further investigation has shown that there may be two distinct types — a true organic stenosis, as described by Landerer Maier (46) in adults, and a spastic contraction of the pylorus Ibrahim (50) Pfaundler (51) Koplik (52) and Wernstedt (53) The latter examined Hirschsprung's old specimens and found that they belonged to the spastic type, and he says that so far no specimen from an infant has been described that belonged to the Landerer Maier type so that probably the majority of the cases reported are of the spastic type. As pointed out by Wernstedt, the mucosa must show an abnormal narrowness in order to prove it congenital.

In two recent cases reported by Rammstedt (54) the evidence of pyloric obstruction commenced respectively five and two weeks after birth. In both cases he made a longitudinal incision of the pyloric tumor down to but not through the mucosa. In the first case he tried to unite the cut muscular wall of the pylorus transversely but the sutures cut through. In the second case no union was attempted Both cases were cured. The contracted muscular wall formed a hard tumor 2 cm. long These two cases seem quite analogous to my Case 1 and could well be interpreted as post natal spasm.

Scudder (93) cites a case of Koplik's in which, two years after a gastro-enterostomy for obstructive pyloric tumor in an infant, there was recurrence of the vomiting Scudder regards this as evidence that the pyloric tumor persists and that the stoma is closing I think that if the stoma is closing it would be evidence that the obstructing pyloric tumor had disappeared after the gastro-enterostomy was made and that the pylorus had resumed its proper function, thus permitting the stoma to close. The vomiting would therefore indicate "recurrence" of the pyloric obstruction and not that it had persisted. It seems to me that this case rather furnishes evidence that some of the hard obstructive tumors in infants are simply spastic contractions that disappear when the pylorus is functionally excluded. It is probable that the part involved in such cases is the pyloric canal.

Doyen (55) expressed himself to the effect that the pylorus is the dominating factor in the pathology of the stomach i.e. through the spasm.

The rôle played by the pyloric canal under similar circumstances is not known, but physiologically it is apparently a very active part, and is perhaps often implicated or independently disturbed. As Cunningham puts it, that it has an important action cannot be doubted its powerful musculature bespeaks the fact. He also expressed the opinion that the musculature of the pyloric canal acts to some extent independent of that of the rest of the stomach and is under the control of a special nervous mechanism.

According to Forsell (12) the pyloric canal is the apparatus concerned in regulating the

evacuation of the vestibular contents. Cannon says that "at all times (during digestion) in the close neighborhood of the pyloric canal the circular and longitudinal muscles, both of which are strongly developed probably cooperate to decrease simultaneously in all directions the terminal segment of the stomach.

It seems to me that there is considerable resemblance in the functional activity of the pyloric canal and the epicardia or the lower 4 5 cm. of the œsophagus. Through the œsophagoscope I have seen the epicardia in spastic contraction in a number of cases (56) The only demonstrable abnormal condition about the stomach in Case 1 is the absence of hydrochloric acid, and the question is, may that be the cause of the spasm?

It has been shown by Hedblom and Cannon (57) that hyperacidity retards the passage of food from the stomach, and Katschowski (58) found that after double vagotomy in one dog a gastric juice of 0.7 to 0.8 per cent of hydrochloric acid produced pyloric spasm in another the spasm was very strong and lasting with an acidity of 0 676 per cent. On the other hand, it is well known that the food, in case of achylia gastrica, may be rapidly expelled from the stomach

As mentioned above the longitudinal muscle fibers of the pylorus constitute the dilatator and some of these fibers are continuous with those of the duodenum In case of achylia gastrica the duodenal contents remaining alkaline during digestion would be a constant stimulus to the longitudinal fibers to open the pylorus, while the absence of acid in the pyloric vestibule would have a tendency to keep the pylorus closed, thus upsetting the equilibrium though ordinarily the pyloric mechanism adapts itself to conditions However as achylia gastrica is of relatively common occurrence and spastic tumors of the pyloric canal are very rare, there must be another etiologic factor so that the explanation herein attempted would hardly suffice. I think that the case must be classified as one of primary motor neurosis Apparently the balance between the two sets of fibers had been fairly well maintained in my case, as the canal was always patulous and there was never stagnation of gastric contents

Leg (59) examining a somewhat limited number of cases of achylia gastrica, could not demonstrate hypermotility

In the table which I have prepared of eleven cases (operated upon) of spastic pyloric tumors found in the literature, together with my own case, will be seen the varying degrees of acidity and it also shows that the cases with subnormal acidity are in preponderance.

TREATMENT

Pyloroplasty would seem to be the ideal operation in cases of this kind but Schnitzler had recurrence in his case, which is included in the accompanying table, and likewise in another case of pyloric spasm secondary to ulcer which he reported in the same paper

In the case of Brunner s, where hyperacidity was considered the etiologic factor there was recurrence after gastro-enterostomy According to Cannon and Blake (67) Kelling (68) Berg (69), and others, the food will pass through the pylorus if this is patulous rather than through a gastro-enterostomy opening hence the failure of gastro-enterostomy unless the pylorus is simultaneously occluded. The necessity of permanent occlusion of the pylorus in such a case is further emphasized by the experiments of Jiann and Grossman (70) who found that if gastro-enterostomy alone was performed there would be no change in the acidity while if the pylorus was simultaneously occluded there was a marked diminution in the secretion of acid.

Recent experiments of von Tappeiner (71) however have shown that there is no method of sewing or tying the pylorus that will keep it permanently closed except that of Wilms (72) who sewed a strip cut from the anterior sheet of the rectus fascia around the pylorus, a method which I have used in Case 2

The results in the five cases where resection was performed were so uniformly good that the operation seems justifiable (resecting the part involved) but the *exclusio pylori* whereby the pyloric end of the stomach is cut through and the stumps separately closed, followed by gastro-enterostomy as first done by Doyen and later by von Eiselsberg (73) may perhaps accomplish the same result

By whom reported	Sex	Age	Chief symptoms	Hydrochloric acid	Diagnosis before operation	Pathological conditions at operation	Kind of operation	Result Remarks
Schnitzler (60)	F	35	Epigastric pain radiating to back Vomiting Tumor	Not examined	Carcinoma	Spastic tumor other wise normal	Pylorectomy	Recurrence in one or two gastro enterostomy Cure is thought not certain
Carle and Fantino (59)	M	39	Epigastric pain Vomiting Tumor	High	Fibrous cicatrix	Slight pyloric hypertrophy otherwise normal	Pylorectomy	Cure
Carle and Fantino	F	32	Epigastric pain Vomiting Tumor	Trace	Carcinoma	Cicatrix near pylorus	Duodenum after Hahn	Improved
Alberti (61)	M	31	Epigastric pain Vomiting	High	Pyloric stenosis	Spastic tumor other wise normal	Pylorectomy	Cure
Brunner (62)	F	34	Epigastric pain Vomiting	High		Spastic tumor other wise normal	Posterior gastro enterostomy	Recurrence few days after operation
Schlatter (63)	F	44	Diarrhoea for 5 months then epigastric pain Vomiting Tumor	Absent	Probable carcinoma	Spastic tumor otherwise normal	Resection and gastro-enterostomy	Cure The tumor was hard and circumscribed, 3x2 cm., and confined to one side
Dauwe (64)	F	40	Stomach trouble for years repeated hæmatemesis Vomiting Tumor	Absent	Probable carcinoma	Pylorus pathologic slight hypertrophied, adherent to pancreas	Pylorectomy Billroth's 1st	Cure
Vanet (65)	M	47	Burning pain No vomiting Tumor	Present		Two cicatrices in wall of grain of corn near pylorus P. I somewhat contracted	Pylorectomy	Cure
Matsuura (66)	M	41	Epigastric pain radiating to back Vomiting Tumor	Subnormal	Probable pylorospasm with ulcer carcinoma not excluded	Cicatrix one about pylorus, otherwise normal	Pylorectomy Billroth 1st	Cure
Matsuura	F	32	Epigastric pain Vomiting Tumor	Trace	Probable pylorospasm with ulcer	Myoma size of pea near pylorus, other wise normal	Pylorectomy Billroth 1st	Cure
Berg gamm (104)	F	32	Typical ulcer pain occult blood in faeces Tumor	Not mentioned	Probable carcinoma	Spastic tumor large ulcer	Resection	Result not mentioned
Lerche	F	30	Burning sensation and sharp epigastric pain shooting to the back No vomiting Tumor	Absent	Probable carcinoma	Spastic tumor other wise normal except for thickening in upper wall adherent to pancreas	Resection Billroth 1st	Cure

CASE Spasm of the pyloric sphincter Posterior gastro enterostomy closure of the pylorus by sewing strip of the rectus fascia round it Female unmarried aged 35 The patient stated that her whole family had weak stomachs and were nervous In childhood she had attacks of vomiting accompanied by the sensation of distention of the stomach as if there were a tight band around the waist She was anæmic in her school days and had stomach trouble for which she took soda She always had to be careful about eating and never could take butter cream, etc and whatever she did eat she could only take in small quantities There had been several light attacks of pain in the right fossa iliaca Since November 1899 her stomach had been particularly bad, and she complained of distress after eating, and belching of gas, frontal headaches, which were relieved on taking soda constipation bad taste in the mouth, and a very much coated tongue at times pain in the epigastrium In the first part of January 1900 she had a tooth extracted under chloroform anæsthesia, after which she vomited for a week and had to stay in bed for a month After this she was on a diet of peptonized milk, eggs, and scraped beef for almost seven months, but without any relief She could only take small quantities of any kind of food, and she nearly always felt nauseated after eating at times she vomited She had much gas on the bowels The patient frequently used an enema, which always made her feel nauseated She could not take cold water

Examination Chest and pelvic organs negative slight tenderness in right fossa iliaca at times sensitive to pressure in the epigastrium, but at no certain point Urine, negative. Fasting stomach, empty After test breakfast, 150 ccm total acidity 80 free

hydrochloric acid, 45. After another test-breakfast, 300 ccm. total acidity 50 free hydrochloric acid, 25. A radiograph taken six hours after a Rieder meal showed considerable stagnation (Fig. 10) The outline of the stomach immediately after the meal is seen in Fig. 1 Ulcus diet and rest in bed were tried, without the slightest relief.

Diagnosis. Possibly ulcer or adhesions causing pylorospasm. Present weight, 85 lbs.

Laparotomy There was no evidence of ulcer or scar on the stomach or duodenum. The pyloric sphincter was spastically closed the gall-bladder normal. Posterior gastro-enterostomy was made and the pylorus occluded by sewing a strip from the rectus fascia around it, as advocated by *Wilms.* Appendectomy

During the operation I examined the pylorus several times on one examination only did the pylorus open and it then suddenly "flew open, so to speak while I held the firmly contracted sphincter between my thumb and forefinger It then fairly readily admitted the tip of the forefinger although it may have been a trifle smaller than normal, due perhaps to hypertrophy of the sphincter This phenomenon of sudden relaxation of the spasm I have observed through the œsophagoscope once in the cardial end of the œsophagus in the case of a young lady who had been treated for gastric ulcer with rest in bed etc. for three weeks, and during a similar previous attack for seven weeks without any relief whatever The trouble disappeared within a few days under the administration of atropine.

The absence in Case 2 of any particular point in the epigastrium sensitive to pressure, and the absolute lack of response to medical treatment with rest in bed, etc. was not in favor of diagnosis of gastric ulcer The remarkable repugnance to fat in any form would have suggested that possibly the gall-bladder might be at fault, causing pyloric adhesions and spasm

With a history of digestive disturbances of so long standing one could expect to find some evidence if there had been any organic lesion, although positive absence of a lesion could of course, only have been determined by intragastric inspection.

The case seemed, therefore, likely to be one of primary motor neurosis. The tongue, which before the operation was swollen beefy red and glazed became normal in appearance. The patient became very fond of butter

Case 3. Acute pylorospasm and chronic cardiospasm. Posterior gastro-enterostomy· stretching of the cardiac end of the œsophagus Male, aged 36. Was well up to the age of 27 when he commenced to have difficulty in swallowing, which developed into a typical case of chronic cardiospasm. Five weeks before coming under my care he was taken suddenly ill with violent cramp in the epigastrium He tried to vomit but could not. Large doses of morphine did not relieve. The man was desperately ill, and his physician referred him to Dr Landholm of St. Paul for operation, 48 hours after the onset. The temperature was subnormal the abdomen was distended, tense and tympanitic.

Laparotomy performed by Dr Landholm revealed an enormously distended tympanitic stomach. The stomach was punctured with a trocar but did not collapse, and an incision was therefore made in the wall of the stomach after which the organ gradually collapsed. The duodenum was not distended there was only a small quantity of fluid in the stomach, and nothing else abnormal was found. The incision was closed. Two weeks later the patient had another similar attack and a posterior gastro-enterostomy was made, which relieved the stomach The cardiospasm, however, now caused him the greatest difficulty, he could hardly get any food into his stomach, and his weight became reduced to 115 pounds.

At this juncture Dr Landholm kindly referred the case to me for examination and treatment of the œsophagus. Total gastric acidity 30. Congo reaction positive. Œsophagoscopic examination revealed a greatly dilated œsophagus and the epicardia in spastic contraction. The epicardia cardiæ was stretched. When the patient was re-examined three months later he had gained 44 pounds in weight. Nearly two years after operation the patient informed me that he had had no trouble with his stomach, but coarse vegetables would occasionally pass his œsophagus more slowly than normal otherwise he was well. I think that there had been a primary atony of the œsophageal wall, with the cardiospasm secondary

This is an unusual combination — chronic cardiospasm and acute pylorospasm I have not been able to find a similar case in the literature except the following reported by Beardsley (74) in 1788 A child commenced to vomit during the first week after birth and kept it up more or less until its death at the age of five years. Beardsley who first saw the boy when he was two years old, and who made the post mortem, said that it did not appear that the boy was attended with

nausea or sickness at his stomach, but he often complained that he was choked, and of his own accord would introduce his finger in order to vomit and relieve the choking He would take large draughts, which at times would become immediately ejected. Autopsy showed a greatly dilated œsophagus, in the walls of which were vesicles or diverticula containing fluid The stomach was unusually large and contained fluid similar to that found in the œsophagus. The pylorus was hard and contracted. This case of Beardsley's has later been described as a case of "hypertrophic pyloric stenosis. To judge from the post mortem findings in the œsophagus and the peculiar history of choking without nausea and the taking of large draughts (very likely to force down the stagnating œsophageal contents) there has also been an obstruction at the cardiac end of the œsophagus. In view of what has been said earlier in this paper in regard to the pyloric stenosis in infants, the case might be interpreted as one of chronic pylorospasm and chronic cardiospasm.

There was no evidence of gastric lesion in Case 3 and the cause of the pyloric spasm cannot be positively determined

Von Openchowsky found that the cortical center for the opening of the cardia is also the center for the contraction of the pylorus

In Case 3 both ends of the stomach were contracted. Œsophagoscopy showed the œsophagus very much dilated, and the walls gave the impression of being hypertrophied and rigid. Just above the diaphragm to the right the œsophageal wall was especially dilated so as to form a shallow pocket It is possible that secondary periœsophageal changes had taken place in this neighborhood which by irritation of the vagus have caused the pyloric spasm.

The following case of Hochenegg's (97) shows the effect of injury to the vagus nerves. A revolver bullet penetrated the thorax of a young girl, producing vomiting pylorospasm and enormous distention of the stomach. She made a complete recovery after a gastrostomy which was permitted to close in a few weeks. The conclusion was some intrathoracic lesion to the vagus or branches.

That inflammatory exudate may disturb the vagus was seen in a case of Küttner's (98) Five days after thoracoplasty for empyema cough and uncontrollable vomiting set in. Necropsy showed the left vagus embedded in dense pleural exudate and a greatly dilated stomach. Fritsch (99) attributed the cough, vomiting and dilatation of the stomach to the irritation of the vagus. My interpretation of Case 3 is that there was a primary atony of the œsophagus with secondary spasm of the cardiac end followed by dilatation of the œsophagus. Whether similar changes took place in the stomach, or whether the acute pylorospasm with gastric dilatation was a result of a periœsophageal irritation to the vagus, there is no way of determining. Gastro-enterostomy would naturally be the operation of choice in this case, with occlusion of the pylorus.

Case 4. Female, 3 years old married never pregnant. Since the age of 15 years the patient occasionally felt a pain about the umbilicus that compelled her to bend forward in order to get relief. She says that it felt as if something pulled as if something were too short. At times the pain would be absent for two or three months, but then again she might have several attacks in a week.

She had not felt this particular pain for the last seven months previous to consultation. About seven months before I saw the patient she had an attack of pain to the right of and on a level with the umbilicus, which lasted for a day no vomiting nor fever A month later she had a similar attack, with which she stayed in bed for a week. Since then she has had more or less pain to the right of the umbilicus, sometimes more pronounced on walking and on turning in bed.

For the last nine years the patient had been distressed after eating, and quite frequently she had a cramp or dull ache in the epigastrium. No treatment or diet had given her any relief. Bowels irregular moving every two or three days without physic.

A diagnosis of appendicitis had been made and operation had been advised.

For three weeks previous to consultation the patient had been in bed with an attack of diarrhœa.

Examination A tall, thin woman, stoop-shouldered, and with long, flat chest. Chest and pelvic organs normal. Abdominal wall somewhat rigid and drawn in. Some tenderness to the right of the umbilicus. Temperature and pulse normal. Fasting stomach, empty After test-breakfast, 20 ccm. of alkaline reaction. No trace of hydrochloric acid after several test meals. Radiograph six hours after bismuth meal, empty First radiograph



Fig. 6.—Resected specimen from Case 4 (p) bronchial (d) lumen.



Fig. Case Six hours after bismuth meal

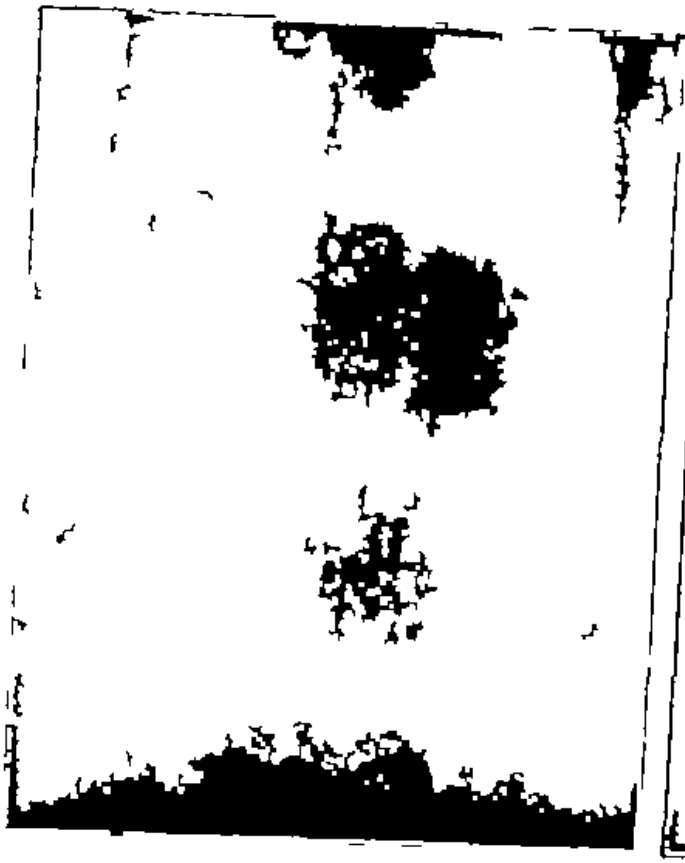


Fig. Case Immediately after bismuth meal

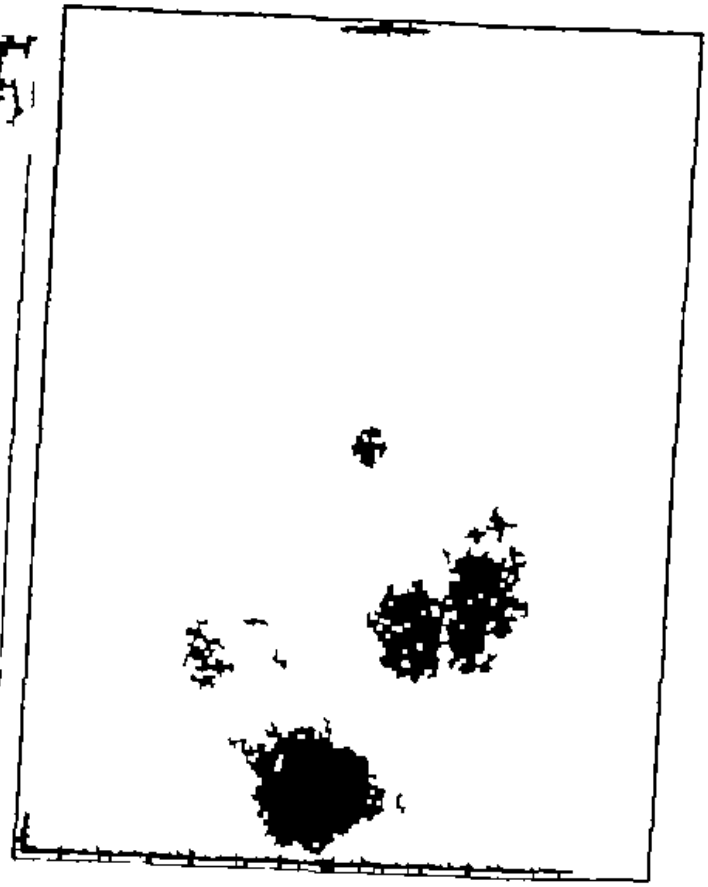


Fig. First radiograph taken few minutes after bismuth meal



Fig 3 Second radiograph taken few minutes after bismuth meal two weeks after the first

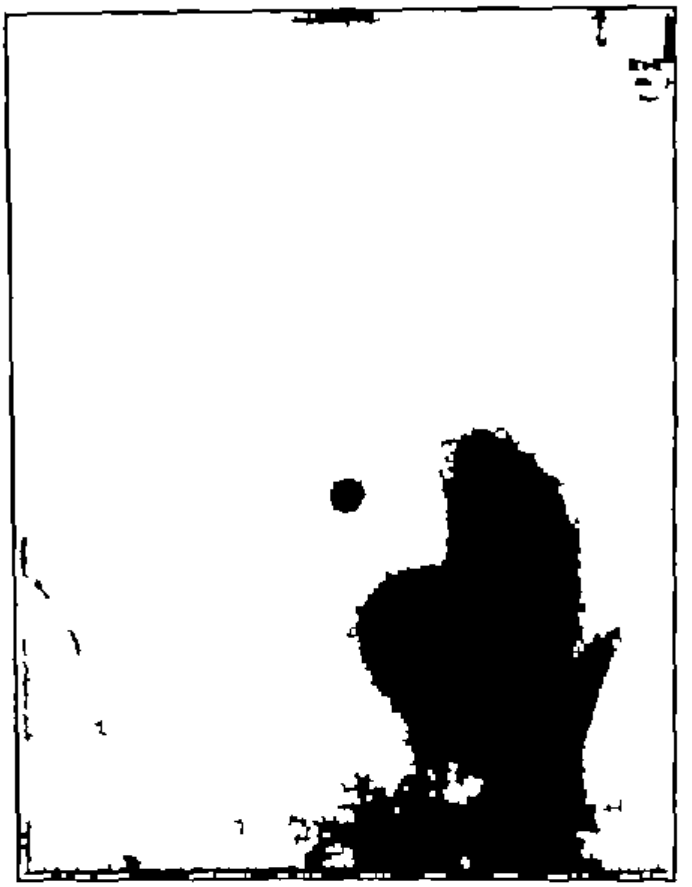


Fig 14 Third radiograph taken few minutes after bismuth meal Six weeks after operation.

few minutes after bismuth meal hour-glass contraction at the vestibule (Fig) Second radiograph a few minutes after bismuth meal, taken two weeks later showed still more pronounced hour-glass contraction of the vestibule (Fig 3)

Diagnosis Spastic hour-glass stomach, possibly due to adhesion

Operation Through an incision through the right rectus muscle the stomach and duodenum were examined and no scar ulcer or any other pathologic condition found. The antrum of the duodenum seemed to be unusually large The appendix, small but apparently perfectly healthy was removed On sweeping the finger under the abdominal wall a tumor was found projecting from under the umbilicus On turning this part of the inside of the abdominal wall up hit tumor was seen subperitoneally directly under the umbilicus The tumor measuring about 5 cm at its base and projecting about 5 cm into the abdominal cavity was removed and found to consist of sac containing putty-like material and hair — dermoid cyst The abdomen was closed A few days later there was evidence of pus in the abdominal wall The incision was reopened barely sufficient to insert a small gutta percha tissue drain, and the pus tract was found to lead to the former bed of the tumor

The patient told me that for several months she had now and then noticed small quantities of a whitish material come from her umbilicus, so the cyst may have been infected through the umbilicus

The patient has felt well since the operation, has had no distress or cramps after eating and has gained weight

A third radiograph few minutes after a bismuth meal, taken six weeks after the operation does not show any hour-glass contraction of the stomach (Fig 14)

The question is, Has the tumor had anything to do with the motor disturbances of the stomach? The patient was very thin and the tumor probably came in contact with the first part of the duodenum and the direct pressure may possibly have caused the hyperkinesis of the stomach by irritating the duodenum

Case 5 Probably cicatrix from gastric ulcer with hour-glass stomach spastic or combined spastic and organic. Female, aged 4 six children. Mother died from cancer of the stomach Menstruation at 4 About this age she was pale, weak, and had gnawing pain in the stomach when it was empty Sometimes she had pain right after eating, at times

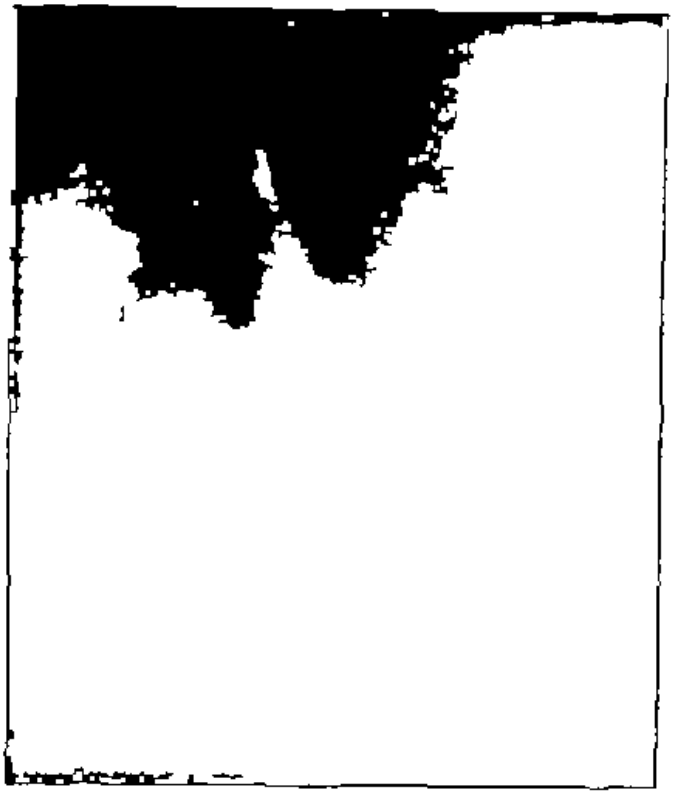


Fig 5. Radiograph of the stomach in the horizontal position of Case 4 about ten minutes after bismuth meal Not tube in the stomach

half an hour later She had been bothered with her stomach in this way ever since She rarely vomited, but t times gulped up food The pain was felt on the left side toward the costal arch she had passed bloody urine for some time

Examination Patient was very anaemic. A sensitive spot toward the left costal arch On catheterization of the ureters the blood was found to come entirely from left kidney Fasting stomach contained some meat and vegetables that she had taken 24 hours previously On two subsequent *examinations the fasting stomach was found* to contain food Several test meals showed absence of hydrochloric acid

On inflating the stomach with air and letting it out, there would be a gush of air after the bulk of it had passed off by pressing on a prominent part above the umbilicus The same as observed when water was poured into the stomach The experiment was repeated a number of times at each sitting At this period the patient was distressed The following week the patient was feeling well, and repeated washings of the stomach failed to show any stagnation of food the above mentioned phenomenon could not be elicited

With the history of gastric ulcer and with the findings mentioned I suspected spastic hour-glass stomach, and a few days later when the stomach again distressed her, I had two radiographs taken One picture (Fig 5) was taken in horizontal position ten minutes after bismuth meal, with lavage



Fig. 6. Radiograph of stomach in Case 4 Taken in the upright position One hour after bismuth meal

tube in the stomach The rubber tube can be readily seen hugging the lesser curvature or the *upper part of the canal of Retzius until it seems to* stop in niche The fundus appears balloon-like to the left, as it is usually seen when radiographed in the horizontal position

The second picture (Fig 6) was taken in the erect position, one hour after bismuth meal. The fundus *is seen sagging down in the upper left corner* and the greater curvature is pulled sharply up toward the lesser The cardiac part is connected with the pyloric part by a narrow streak of bismuth. The peculiar shape of the lesser curvature will be noted

I thought that this peculiar form of the lesser curvature might possibly be due to an exaggerated contraction of the oblique fibers forming the sulcus salivalis or canal of Retzius so graphically described by Gyllenskoeld (loc. cit.) This canal may be of great functional importance Cohenheim (75) experimenting on dogs with duodenal fistulæ found that if the dog was allowed to drink water or a salt solution after a meal while the stomach was full, the water would appear in quick spurts and almost clear and unmixed with acid at the pylorus It had passed along the canal of Retzius



Fig 7 Fig 8

Pebbles causing pylorospasm

Professor Ernest, in discussing this paper of Cohenheim's, said that in people who had swallowed corrosive fluids in small quantities he had invariably found the destruction along the lesser curvature at post mortem. What relation the function of this canal has to the pathology of the stomach remains to be seen, but we know that the largest percentage of cancer and ulcer of the stomach occur along this tract — the pylorus, the lesser curvature and the cardia.

Diagnosis Ulcer or cicatrix on the lesser curvature in the upper half possibly with perigastric adhesions but spastic hour glass contraction alone likely on the basis of cicatricial contraction

In order to verify a diagnosis of spastic hour-glass stomach it would be necessary to take two or more radiographs at different times.

Operation was postponed on account of hæmaturia.

Hour-glass stomachs are usually divided into the congenital and acquired. Rieder (76) says that very few cases of congenital hour glass stomach have been reported in German literature, and Cunningham (loc cit) and Moynihan (77) both deny the existence of this form.

The acquired hour-glass stomach may be caused by (1) cicatrix from ulcer or corrosives, (2) perigastric adhesions, (3) tumor (4) spasm and (5) tight lacing is given as a cause by some

Budinger (78) reported a case in which at operation he observed a spastic contraction of the stomach at the junction of the vestibule with the body The contracted portion was 4 cm. long and very firm It disappeared suddenly and reappeared There were also a few adhesions and a small cicatrix Schmitt (79) has observed similar spastic contractions at operation

Since the X rays came into use in the examination of the stomach, a number of cases of spastic hour-glass stomach, mostly secondary to ulcer cicatrix or cancer have been reported by Rieder (76) Baron and Barsony (80) Haudek (81) Jolasse (82) von Schmieden (83) Stierlin (84) de Quervain (85) Hartel (86) Perthes (87) Hertz (88) and Faulhaber (89)

The importance of the use of radiography in the diagnosis of diseases of the stomach has been well demonstrated by Clairmont and Haudek (90) Of 200 cases in which they had used the X rays for diagnosis more than one-third were operated upon, and it was found that no serious mistake in diagnosis had been made.

Stiller (91) claims that the radiograph of the stomach obtained after a bismuth meal is artificial and not a true expression of the real form, but he seems to be the only one of that opinion

The test of Holzknecht and Fujinami (94) by letting the patient drink a certain quantity of water and take a pair of Kaestle's capsules, after which the length of time this remains in the stomach is ascertained by the aid of the X rays, may be of value in differentiating between spastic and organic obstruction.

Case 6. Pylorospasm caused by foreign bodies. Female, aged 16 native of Vienna, where she lived until the age of 4 years. At the age of 8 years she swallowed 48 pebbles, imitating a performer that she had seen in the circus The following day she had much pain in the stomach but she did not vomit. She was taken to the hospital (Allgem. Krankenhaus, Vienna, Med. 3) where she stayed for two months. She said that operation was advised but refused by her people. Since then she has had periodical attacks of violent pain, vomiting and epigastric distention She said that her stomach would stand out like a football, which was verified by the attending physician The vomitus was bitter and of yellow color but only when she had taken anything into the stomach The bowels did not move during attacks The last attack was unusually long, having lasted a week.

Examination A bulging was seen in the epigastrium, which was very tense and sensitive to touch and proved to be the stomach X ray examination was advised but refused She had had four attacks during the last year

The patient was taken to the hospital, and preparatory to the operation a dose of castor oil was administered, with the result that two pebbles were found in the stools (Figs. 17 and 18) They measured 14 × 10 mm and 22 × 19 mm and were quite smooth Although the patient was feeling quite well laparotomy was decided upon for the following reasons Taking it for granted that the patient's history was correct, it seemed to me that the pebbles were rather small to cause so much trouble, because incredibly large foreign bodies are known to have passed the pylorus An abnormal narrowness of the pylorus or adhesions were therefore thought to have excited the pylorus to spasm.

At the operation a careful examination of the

stomach and bowels failed to disclose anything abnormal and the abdomen was closed. The patient has had no trouble with her stomach since the operation two and one-half years ago.

One may be reasonably sure that the comparatively small pebbles had caused the severe pylorospasms that the patient suffered from for eight years.

Disturbance in the gastric nervous apparatus is responsible for the spasms, and the cause of this disturbance may either be an organic lesion of the stomach as in Case 5 which is the most frequent irritating foreign bodies, as in Case 6 or there may be no demonstrable lesion, as in Cases 1 and 2 the so-called idiopathic spasm. The pylorospasm in Case 3 is very likely idiopathic, but an intrathoracic irritation of the vagus cannot positively be excluded

It has been quite commonly assumed that hypersecretion or hyperacidity causes pylorospasm, but no evidence has been brought forth to verify the correctness of this

As mentioned above Katschowsky found that a gastric acidity of 0.7 to 0.8 caused pylorospasm in dogs upon which he had made double intrathoracic vagotomy By treating them with soda and milk diet whenever the acidity was above 0.4 he prevented the pylorospasms.

Fritsch (99) in his experiments did not treat his vagotomized dogs with soda to regulate the acidity and all the animals that lived for some days after operation had greatly dilated stomachs at the time of death These experiments would seemingly demonstrate that high acidity causes pylorospasm On the other hand Friedenthal (100) in a dog cut off both vagus nerves above the diaphragm and nervi splanchnici on both sides Six weeks later he removed the spinal cord below the fifth thoracic vertebra. The dog had no digestive disturbances and remained well up to two weeks after the last operation when he died from meningitis Hedblom and Cannon found that on feeding potato acidified to 0.25 per cent with hydrochloric acid to *healthy cats*, it left the stomach faster than normal, while if acidified to 1 per cent it left the stomach more slowly than normal Although these investigators, by the aid of the X-rays, demonstrated retardation in the exit of food from the stomach in the presence of high acidity they did not observe pylorospasm. It may therefore be inferred that with the nerves of the stomach in a normal condition, high acidity per se does not cause pylorospasm.

Engel (96) in a case of *pyloric obstruction* in an infant, performed jejunostomy thereby excluding the stomach entirely In spite of this vomiting persisted until death occurred three weeks after operation. Engel repeatedly demonstrated gastrosuccorrhoea and concluded that either the latter and the spasm started simultaneously or that the spasm was secondary It seems more likely that the spasm and the increased acidity are both expressions of the same stimulation of the nerve

From the cases in the table and other cases in this paper it will be seen that spasm may be present whether the acidity is high, normal, a mere trace or totally absent. In the majority of the cases in the table the acidity is subnormal or absent, and in a case of spastic tumor of the pylorus recorded by Schutz (95) there was also no hydrochloric acid present.

The vagus and the sympathetic nerves are antagonistic to each other in their regulation of the motor and secretory functions of the stomach the impulses through the vagus augmenting these functions, while the sympathetic is inhibitory in its action.

Disturbance in the harmony between the two antagonists may give rise to pathologic conditions, and this question has been studied by Eppinger and Hess (101) By subcutaneous injections of pilocarpine and atropine which influence the vagus system, and adrenalin for its effect upon the sympathetic, they studied the symptoms and *effect of the variation in the tonus of the two nerve* systems.

Their observations led them to believe that every person who reacted strongly to pilocarpine and atropine was insensitive to adrenalin, and vice versa that persons who showed strong reaction of the sympathicus after adrenalin injection were not sensitive to pilocarpine and atropine and that changes in the two nerve systems could by these means be sharply differentiated They

pointed out that there are cases with permanently increased tonus of the vagus nerve, and they observed that gastric ulcer is a strikingly frequent occurrence in such cases.

Although Petren and Thorling (102) and also Bauer (103) found that some cases would react to both stimuli, indicating stigmata in both nerve systems, the tests and this field of study inaugurated by Eppinger and Hess promise to become of great clinical value. Von Bergmann (104) says that cases where only one of the nerve systems is affected could hardly occur — they overlap

Lichtenbelt (105) in his experiments, found that local spasms of the muscularis mucosa of the stomach and first part of duodenum may cause the formation of ulcer by constricting the blood vessels that pass through it to supply the mucosa the part thereby made ischæmic is exposed to the digestive influence of the gastric juice Rossle (106) on the basis of the study of a large post mortem material, has attempted to show that the gastric and duodenal round ulcer frequently is secondary to disease of some other organ, and is reflexly brought about through the medium of the nervous system in the way explained by Lichtenbelt. Rossle says all observers agree that stimulation of the vagus causes hypertonia of the sphincter pylori which may extend into a continued spasm Thus, by the same stimulation of the vagus the vicious circle is complete, i e the local spasm of the muscularis mucosa followed by ischæmia, the spastic occlusion of the pylorus, with retention and subsequent autoindigestion of the necrobiotic mucous membrane.

According to the above mentioned authors and other recent writers the nervous system plays a prominent part in the pathology of the stomach, and the local spastic contraction is primary In the production of ulcer i e primary as far as the stomach is concerned

In a comparatively small group of cases there is spasm of the pyloric end of the stomach or the cardial end of the œsophagus without any demonstrable lesion or apparent cause, and they (Cases 1 2 and most likely Case 3) are of special interest in this paper These cases are termed idiopathic, whereby is meant that there is no evident lesion to account for the spasm in the organ where the spasm occurs but well may it be secondary to disturbance in another organ, in the sense of Rössle.

Constitutional predisposition is an important factor and an individual with increased tonus of the vagus or whose vagus system is hyperirritable may react strongly to a slight stimulus.

The visceral nerve systems are in intimate relation with the internal secreting glands The products of the latter may stimulate or inhibit the vagus or the sympathetic nerves, and the glands, according to Eppinger Falta and Rüdinger (107) probably only in this way exercise their influence upon the organs.

Pathologic changes in the internal secreting glands may therefore be an etiologic factor in the spasms under consideration in this paper

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DEPARTMENT OF TECHNIQUE

A SIMPLE APPARATUS FOR TRANSFUSION BY THE ASPIRATION-INJECTION METHOD

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IN rather recent times, transfusion by the method of aspiration and injection has been revived and quite frequently applied. In its favor are simplicity sureness, and exact estimation of the amounts of blood transmitted. Different devices for the mode of transfusion have been advocated but all are modifications of apparatuses used years ago (Howe, Colin, and others) Among others, the writer has found that a glass syringe with needle, or its



Fig Rubber bulb (about 30 ccm) and tips for insertion into veins of donor and recipient Two Joints.

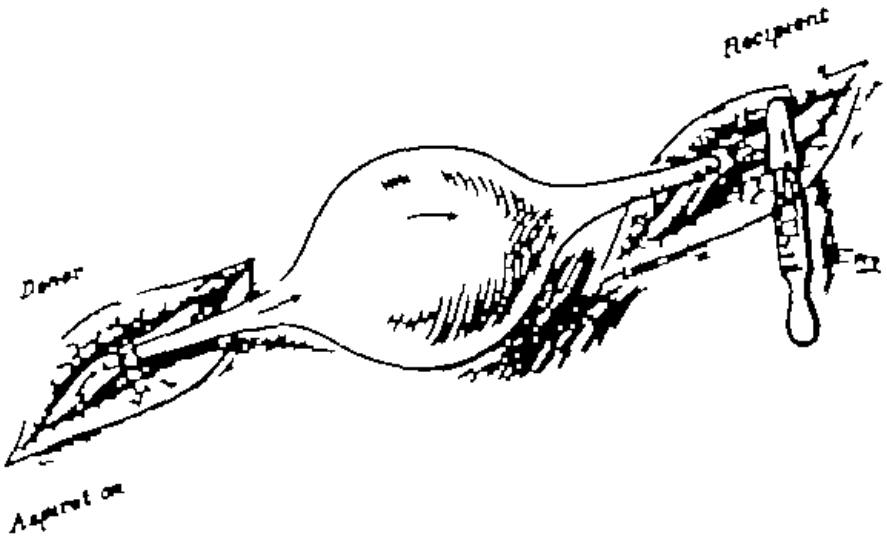


Fig Apparatus filled with salt solution and tips fixed in vessels by ligatures Salt solution expressed and screw-fine clamp applied to recipient vessel Aspiration from donor's vessel until bulb is filled with blood

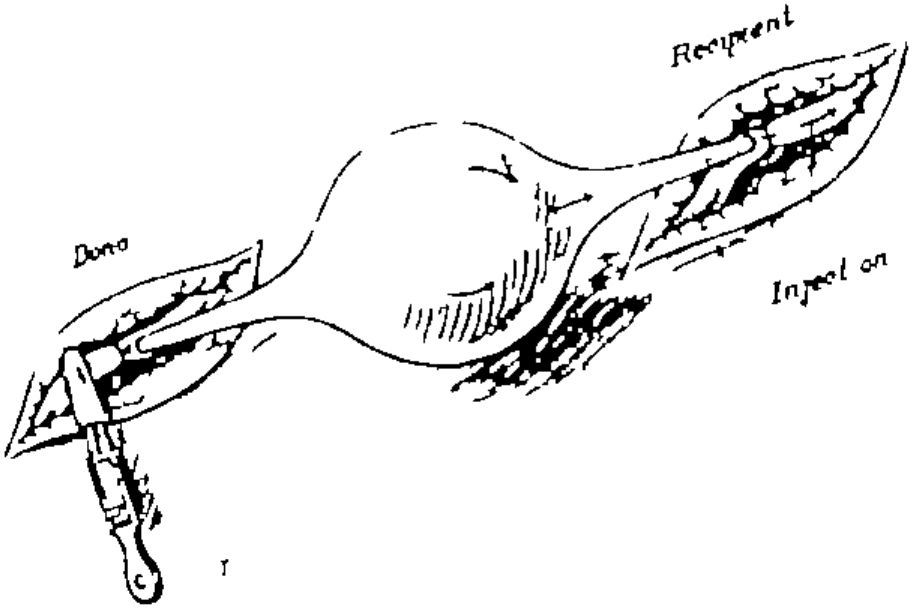


Fig 3 Serrefine clamp changed to donor vessel and blood injected into recipient



Fig 4 Experiment bleeding and transfusion Method aspiration-injection, with accompanying depicted apparatus. Dogs used for experiment Tracing of recipient First half of record shows effect of bleeding 0.43 gms. (weight of recipient 6041 gms.) Second half of record shows effect of transfusion, the blood pressure returning to normal in series of elevations, each of which corresponds to an injection of blood

end drawn out to suitable size, is practicable. Anti-coagulants are not essential, and probably are better avoided The indirect method has opponents, but frequent favorable clinical reports are to be duly considered. The accompanying depicted modification of Aveling's method has proved successful in the writer's experimental work. The procedure is simple and rapid in execution and positive as to results. The amount of blood transfused can be closely estimated as may be seen by the accompanying illustrations (Figs, 1 3 and 4)

TECHNIQUE OF CLOSING THE ABDOMINAL INCISION

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House Surgeon, Columbian Hospital for Women

An article by Dr J Wesley Bovée,[1] entitled "The Preferable Technique of Closing the Incision in Abdominal Section and Herniotomy appeared in 1901 Since that time he has abandoned for his work all suture material except iodine catgut, prepared as described by him, and kangaroo tendon. He has almost entirely abandoned the abdominal bandages after operations, perhaps not using one bandage in a thousand cases, and very rarely employs interrupted sutures.

Of course, since adopting iodine sterilization for the operating field corrosive sublimate gauze is not used, plain sterile gauze being used in contact with the wound. He has for fully ten years used a *true purse-string suture for closing the peritoneum* to lessen the danger of intraperitoneal adhesions still more than did the whip stitch previously described by him When through-and through sutures were used for closure such peritoneal eversion was studiously avoided, as it was regarded as endangering hernia. With the tier suture it does not create such fear

A few weeks ago Dr Bovée learned this plan devised by him was not new as it had been described and illustrated twenty-six years before[2] by R. Stansbury Sutton, of Pittsburgh. Perhaps it is unnecessary to add that he employs overlapping of fascia in ventral hernia and diastasis recti abdominis His plan of closing the simple, subumbilical median incision is with five layers of suture one of which, the main or rectal sheath, is of kangaroo tendon of medium size and the others of No 2 iodized catgut. The incision is usually made nearly or quite one-fourth of an inch to the right of the median line and after exposing to view the right rectus muscle that structure is separated from the linea alba by blunt dissection and the transversalis fascia divided in turn about one-fourth inch from the linea alba. The peritoneum and subperitoneal fat and fascia are carefully lifted and divided to correspond to the preceding dissection Almost never are hemostatic forceps applied to the wound, bleeding yielding to compression with hot, wet gauze

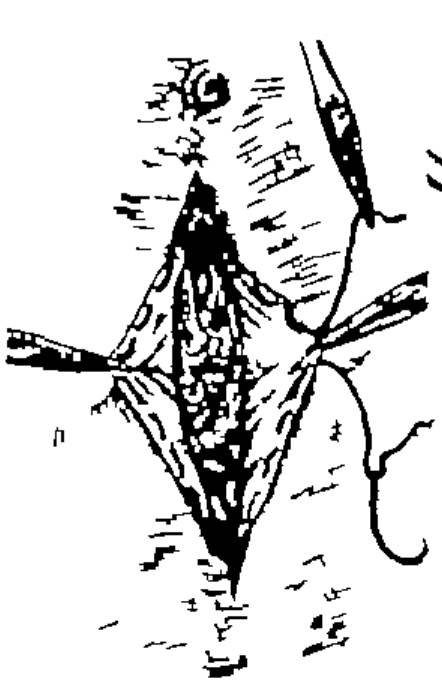
In closing the incision when it is less than six inches in length, the plan we now recognize as the Sutton method is used. Fig 1 shows the plan of closing the peritoneum. The peritoneal margin on either side at the middle of the wound is lightly grasped by a small hemostatic forceps which stabilizes it while the suture is placed A No 2 iodized catgut in a curved needle is first passed from without inward through the peritoneum about one fourth of an inch back of the forceps grasping the edge opposite the operator

It is made to re-enter the peritoneum about one-fourth inch toward the umbilicus. This plan of weaving in and out through the peritoneum about one fourth of an inch from the margin is continued around to the starting point. An assistant now carefully draws taut and ties this suture while the operator prevents protrusion of viscera.

The transversalis fascia is closed with the same suture (Fig 2) which has not been severed, and may be placed in the ordinary spiral form The peritoneum being more firmly attached in the umbilical region than near the lower end of the incision, it is carried by the purse-string suture to the upper end of the wound and therefore the transversalis fascia is sutured from that end toward the pubes. The suture in that structure is finally tied by the well-known crochet stitch, two stitches being taken and the end pulled through the loop and cut off an inch from it. The fascia forming the external sheath of the rectus muscle is now closed with kangaroo tendon of the medium size, using the lock stitch of the sewing machine for the purpose This is practically the shoemaker's stitch as employed by Marcy (Fig 3) It may be placed more rapidly than the shoemaker's stitch as it obviates the necessity of unthreading and threading the needle at every stitch One end of the suture is fastened into the eye of a needle fashioned after the Peaslee perineal type and the other end is picked up by an assistant Beginning at one end of the incision the needle is pushed through the fascia on both sides until the threaded eye is well exposed. The assistant now passes the end he holds through the space between the needle and the suture as they lie closely paralleled and again grasps the free end The needle is now withdrawn and the stitch is locked

This process is continued at intervals of one-

[1] Am J Obst. N Y [illegible]
[2] Am J Obst. N Y [illegible] p. 468.
A new method of closing the peritoneal sac after Tait operations. Gynec T [illegible] 11



Fig



Fig

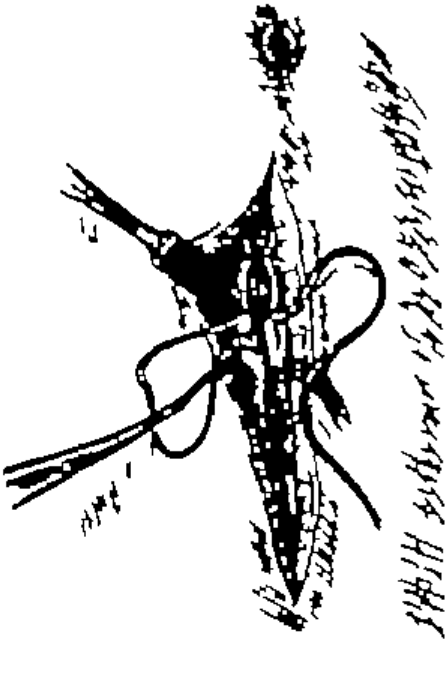


Fig 3



Fig 4

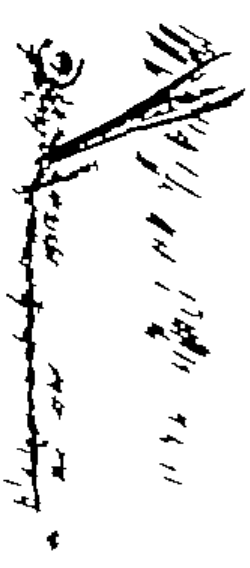


Fig 5



Fig 6

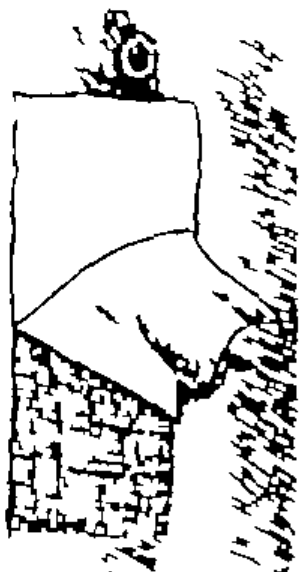


Fig 7

fourth to one-half an inch until the other end of the wound is reached and the two ends of the suture tied in a square knot

The subcuticular fat is now closed by spiral suture of No 2 iodized catgut (Fig 4) The ordinary curved needle with cutting lateral edges is passed through the fascia in the extreme upper end of the wound and instead of tying the tur the free end of it is simply held by a forceps A spiral suture now closes the f t care being ex ercised that the needle lightly picks up the fascia each time it crosses the median line at the depth of the wound. Without securing or severing the suture when it is finished, the same suture mate rial and needle are used to close the skin by a subcuticular suture (Fig. 4) which when placed, stops at the umbilical end of the wound. The two suture ends, one attached to the fascia and held by forceps, and the other still in the needle are liberated and tied together and the knot thus formed readily settles to some point between the skin and fascia and is therefore buried. The

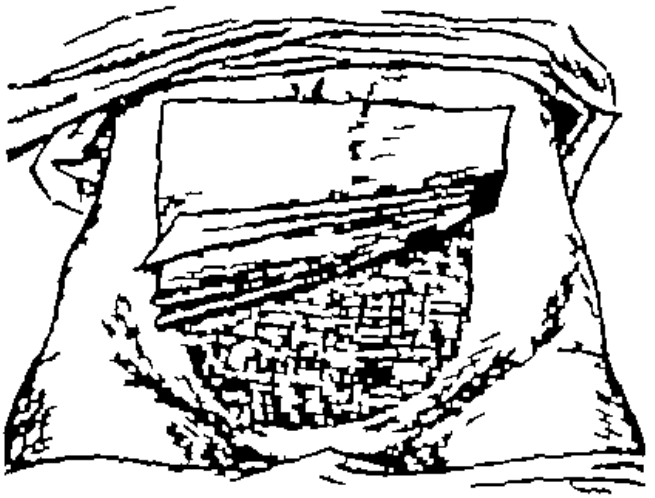


Fig 8.

cut ends are easily pushed under the skin (Figs. 5 and 6) and we have a wound closed completely and with absorbable suture material completely buried (Fig 6) When this layer of fat is so thin that it does not need suturing, a different plan is adopted. The subcuticular suture is fastened to the fascia at the upper end of the wound and then inserted. At the lower, or finishing, end it is tied to the catgut closing the transversalis fascia or to the kangaroo tendon closing the fascia.

No effort is made to clean the skin in the field of operation, but a few layers of sterile gauze, two inches wide and two inches longer than the incision are carefully placed over the sutured wound and in turn covered by a layer of oiled paper (Fig. 7) The abdomen is now covered by a well fitting pad of gauze six to ten layers, soaked in flexible collodion. Over this a layer of rubber sheeting is placed (Fig. 8) to prevent collodion adhesions between dressings and the clothing of the patient or bedding. An hour or two later the collodion having dried, this sheeting is removed and the dressing is removed thirteen days after operation — one day before the patient is out of bed. Usually no subsequent dressing of any kind is needed, although a layer of muslin or silk between the scar and corset is advised for a few months.

When the wound is more than six inches in length the peritoneum is closed by a continuous, spiral suturing the cut edges being turned toward the skin, during the process, sufficiently to prevent their being exposed in the peritoneal cavity

In very rare instances only are additional interrupted sutures, either single or mattress, used. In all other respects the closure is the same in long as in short incisions. In umbilical or other ventral hernia, fascia overlapping oft times is required.

SCALPEL SURGERY OF TUMORS OF THE BLADDER

By G. SHEARMAN PETERKIN M D F A C S Seattle, Washington

FIFTY-THREE per cent of mortality in total extirpation of the bladder and 45 per cent in suprapubic resection, If the mortality following recurrence is included are the statistics that confront the profession of medicine in operation by means of the knife on tumors of the urinary bladder This being true a vital question arises How can the science of surgery reduce this appalling mortality

At present the general surgical world does not recognize that surgically the bladder is often practically located in the peritoneal cavity and this fact, combined with the anatomical structure and physiological functions of this organ, indicates rather than contra-indicates radical surgical methods

It is the writer's opinion and experience that the principles of surgery of to-day as applied to malignant growths in other parts of the body—the breast, for example—are applicable to the bladder and the answer to the question proposed is to be found in the maxim, ever to be borne in mind, The more radical the operation the greater the percentage of cures

The term radical as here used signifies opening the peritoneal cavity whenever by so doing it gives freer access to the pathological area, and cutting wide of the tumor to the extent of removing all the layers of the bladder wall, including the peritoneum, t least one inch beyond the area involved.

That this is not radical, and that it is the premises upon which the general principles of surgical technique must be constructed that will govern operations upon tumors of the bladder the writer will attempt to prove and in so doing will out-

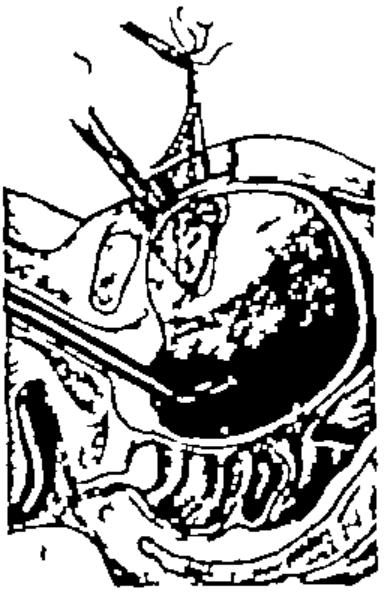


Fig. 1. After Hagner Use of sutures to outline bladder tumor

line the general principles of surgical technique which, if employed will lessen the percentage of operative mortality and increase the per centage of cures over those now attained through operative treatment of bladder tumors.

The term non-radical is defined as suprapubic resection when opening the peritoneal cavity will give better access to the field of operation—the cutting out of some layers instead of wide excision of all layers of the bladder wall surrounding the tumor operating through an operating cystoscope, a method as antiquated as Bottini's operation on the prostate.



Fig. 3

EVIDENCE THAT OPENING OF BLADDER VIA PERITONEAL CAVITY IS NOT DANGEROUS

(*a*) Laboratory experimentations upon animals by Barney Tuffier de Quervain, and others, have demonstrated that normal urine is not very irritating to the peritoneum, and the chances of infection are small.

(*b*) Reported clinical cases of rupture of the bladder with recovery after urine has escaped into peritoneal cavity (Alexander Zuckerkandl, Keyes, and others)

(*c*) The transperitoneal method of operations on bladder growths as suggested by Rydygier in 1888 advocated by Harrington in 1893 and popularized by the Mayos in 1908 which method gives 9 per cent mortality as against 20 per cent by suprapubic resection (Watson)

(*d*) Demonstrations by Tennant of Colorado that transperitoneal cystostomy can be done even in presence of severe cystitis without danger

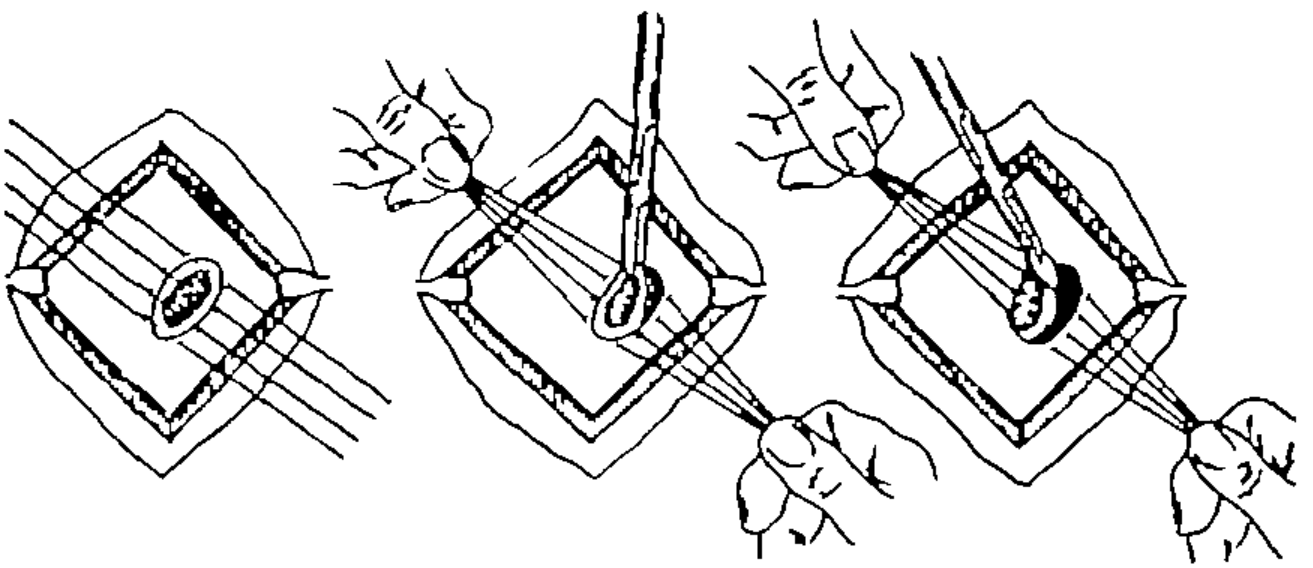


Fig. 2.



Fig 4. Papilloma of bladder. Showing the complex character of the villi and very liberal blood supply



Fig 5 Papilloma of urinary bladder. Showing infiltration in carcinomatous degeneration a, epithelium stratified columnar in type b, small round cells, numerous in the papillæ c, epithelial cells invading stroma of round cells d, blood-vessels

(e) An experience encountered by virtually every surgeon who has operated extensively—the accidental opening of the urinary bladder during operations with no bad results.

Evidence that the anatomical structure and physiological functions of the bladder are such that free excision of its walls is not contra-indicated is furnished by cases reported by Harris of Chicago, Zuckerkandl, Rovsing and others also three cases by Kolischer and Schmidt, where more than two-thirds of the bladder wall was removed, the healed bladder having a capacity of 250 to 300 ccm within eight weeks.

Unquestionably such evidence demonstrates that the anatomical locality structure and physiological functions of the bladder do not contra-indicate radical methods. Yet the question remains to be answered, why a cutting operation should virtually always be radical. The answer is self-evident.

1 No cystoscopist can tell by means of cystoscopy whether a tumor is benign or malignant.

2 No pathologist can tell whether any bladder tumor is benign or malignant unless he examines the whole tumor to permit him to do this would necessitate a radical operation

3 Hugh Cabot, E. Hurry Fenwick, Sir Henry Thompson, Watson Kolischer Israel, Cathelin, and most of the well-known urologists agree that clinically about one-half of all bladder tumors are malignant.

4. The same urologists believe that in the most frequent of all so-called benign tumors, the papillomas, there is a recurrence of almost 40 per cent after operation (Fenwick)

To reiterate these facts exist About one-half of the bladder tumors are malignant 40 per cent of benign tumors recur after operation the cystoscopist and pathologist have no means of making a preoperative diagnosis as to malignancy of tumors. Therefore, we are more logical and less radical in considering all tumors of the bladder malignant until our present methods of diagnosis are improved.

Moreover that we can consider them malignant with less danger to the patient is demonstrated

(1) By clinical experiments showing that in operations on the bladder even if only small portion of the bladder wall is left, this remaining portion has the power of development to the extent of almost regaining the total physiological bladder capacity and (2) by the low mortality of the transperitoneal operation as against suprapubic resection

With such a collection of facts, can the surgical world give any logical reasons why operations on the bladder should not be radical, as here defined

In concluding this part of the argument, to show the value of radical versus the non-radical operations in obtaining a cure let me again quote Watson, who in February 1913 presented



Fig 6 Ureter openings before the apparatus is applied
Fig 7 Ureter openings after the apparatus is applied Note the pouching of the ureter, especially the right projecting so that it has the appearance of an erect nipple, protruding thus causes the urine to drop in the cup, not to seep along the skin

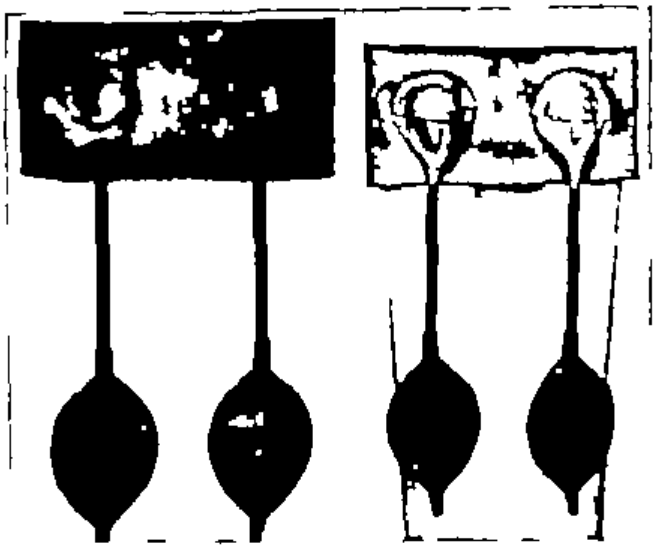


Fig 8. Inside of apparatus. Entire apparatus composed of rubber
Fig. 9. Exterior of apparatus

statistics of 62 cases of real radical operations (total extirpation) with 33 deaths, 14 post-operative deaths, and 16 recoveries (and in all cases of death only two were attributed to recurrence) as against 103 cases of suprapubic resection, with 20 per cent deaths, 50 per cent recurrence, to be followed by 62 per cent mortality

Comparing total extirpation with suprapubic resection, the latter presents a far greater percentage of recurrence, since if we review the histories of the non-radical operations we find most of them are virtually operations of election, not of necessity as were the operations of total extirpation.

Being radical alone will not reduce the mortality and such is not the claim of the writer for an instant. The essential subsidiary aids of correct surgical technique are equally as important. By accepting as a premise upon which to work the radical operation as here defined then logically reviewing the causes of operative deaths, the means of preventing such deaths will become evident and can be classified so as to be of actual working value

To demonstrate Exclusive of faulty technique due to lack of asepsis, to lack of anatomical knowledge and to inexperience, the causes of death after operations on tumors of the urinary bladder are (1) Shock (2) ascending renal infection (3) uræmia (4) recurrence and metastasis.

The first cause of death, shock, is preventable through (1) early diagnosis (2) shortening the duration of operation (3) preventing hemorrhage and (4) proper preoperative preparation—the selection of cases, anæsthetist, and anæsthetic.

1 *Early diagnosis* The clinical sign that permits of early diagnosis is hæmaturia, especially symptomless. Though this hæmaturia has the clinical characteristics of appearing without cause being unaffected by rest position or exercise, nevertheless cystoscopy by an expert cystoscopist is imperative for by no other means can the source of the hæmorrhage be located and the size, number position and possible characteristics of the tumor be ascertained.

2 *Shortening duration of operation.* This is attained ( ) by formulating a definite plan of procedure previous to operation, through cystoscopically locating the exact position of tumor or tumors, outlining the amount of bladder wall to be removed etc., and then perfecting a technique that will permit of readily marking out the area to be removed whether the bladder is collapsed or not (Fig 1 after F R. Hagner)

(*b*) By increasing the size and clearness of the visual field by a long abdominal incision, by opening the peritoneum, by position of the patient, etc.

( ) By keeping field of operation dry when bladder is opened through catheterization of both ureters previous to operation, administering ether or preferably chloroform, and placing the patient in the Trendelenburg position as under these conditions anuria is produced and practically very little urine enters the bladder (Bovée)

(*d*) By catheterizing the ureter near which the tumor is located previous to operation thereby clearly defining its outline and locality so as to

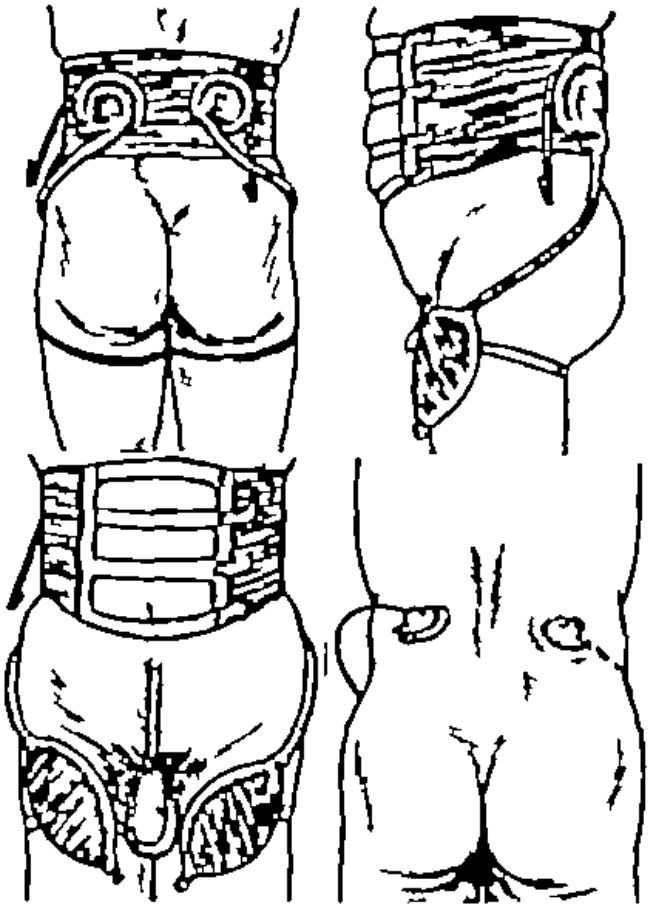


Fig. Apparatus applied. Four and one half inches from center, two inches from crest.

permit removing of bladder area near ureter without injury of same and the more ready transplantation of this canal if necessary.

(*e*) By permitting escape of content of bladder through urethral catheter or cysto-scope after marking out area to be removed, to prevent metastasis, wasted time in sponging, and post operative shock through possible sepsis from contents of the bladder.

3. *Prevent of hemorrhage.* This is done by employing technique that will eliminate the direct handling of the tumor as follows: Insert No. 2 catgut suture just beyond edge of healthy bladder wall to be excised, then under tumor (the finger in rectum or vagina if tumor is at base) to similar point bladder wall on opposite side. Now incise bladder wall (all layers) and grasp same with forceps as illustrated (Fig. 2) then assistant using these sutures and the surgeon the forceps as tractor excise tumor.

4. *Proper preoperative preparation.* Time prohibits the consideration of these factors that would aid in preventing shock, yet the author personally recommends the use of spinal anesthesia in bladder tumors whenever possible and would refer the readers interested in this form of anesthesia to the articles in the bibliography on this subject.

The second cause of death, ascending renal infection, is prevented (1) by transplanting the ureter in one of two places—the bladder or the lumbar region, for in both instances should infection take place it can be cured by local treatment, which cannot be done if the ureters are transplanted into any part of the intestines or concealed part of the body. (2) by selecting the points of exit and maintaining direction of transplanted ureters so as to prevent back pressure (note Case 3).

The consideration of the third cause of death, uræmia, is omitted in this paper as its pathological phenomena are within the province of the internist and cannot be prevented by surgical technique as can shock, renal infection, and metastasis.

The fourth cause of death, recurrence and metastasis, is prevented (*a*) by early diagnosis (*b*) by radical operation, as here advocated, (*c*) by no direct handling of tumor so as to break or destroy its continuity, especially a papilloma (*d*) by walling off with abdominal pad the surrounding abdominal walls and viscera.

As a practical illustration of the value of radical operations on tumors of the bladder I shall report three cases.

Case 1. Papilloma. Male patient, married, aged 46. Operated upon December 7, 1909, left hospital fully recovered, December [illegible], no evidence of recurrence; died June 6, 1913, three and one half years later with no evidence of bladder involvement, but from chronic nephritis.

Case 2. Papilloma. Profuse hematuria and retention due to villi blocking the mouth of bladder, prostate being normal. Growth was located one-half inch to right and one fourth inch posterior to left ureteral orifice. Photograph of gross specimen (Fig. 3) shows tumor to be of characteristic villous type. Drawings from microscopic sections show (Fig. 4) By the complex character of villi and their very liberal blood supply, but the tumor is benign; (Fig. 5) By the infiltration and carcinomatous degeneration that the tumor is malignant, not benign.

Points of Interest

1. Only a small microscopic area showed the true character of tumor that it was a commencing carcinoma confirming the statements made as to the cysto-copist's and pathologist's ability to diagnose the benign or malignant character of bladder tumors.

All layers of the bladder wall were excised and at a distance of three-fourths of an inch from the tumor which probably accounts for its non-recurrence.

3. The ureter was catheterized to facilitate

its removal and lessen the duration of the operation.

4. The tumor being situated at the base of the bladder the value is shown of two fingers of an assistant inserted in the rectum to elevate the tumor so as to bring it into better view and shorten the operation. A proctoscope is sometimes more efficient.

5 The cut edges of the bladder wall were united only by interrupted catgut sutures ten days chromicized. A suprapubic drain was inserted. Experience to-day would, in order to hasten recovery cause the operator to close the bladder catheterize every four hours if necessary and not drain by permanent catheterization per urethra.

6. Never if possible to avoid it, incise bladder then excise tumor by marking out the area to be removed previous to operation, make the only incision into the bladder the excised area, thereby materially aiding in preserving the bladder function, lessening the length of the operation, and hastening recovery

7 A special point to be remembered, because of the rapidity and frequency with which papilloma recurs, is that cystoscopy should be performed every month for one year every three months the second year and every six months the third, in order to anticipate an early recurrence.

CASE Male age 42, referred by Dr W A Shannon Sarcoma operated on May 7 9 June 8th patient left hospital died May 9, 9 cause metastases present in the form of two large sarcomatous masses on spine Symptoms previous to operation, constant hematuria and painful urination when hemorrhage was severe

Points of Interest

Over one-half of the bladder wall was removed July 20 1910 63 days from the date of operation the bladder capacity was 310 ccm. no recurrence of bladder symptoms at time of death, showing the power of a small portion of bladder wall to regain virtually the normal physiological capacity of the whole bladder when a large amount of bladder wall is removed.

As the tumor was situated on the right side of the bladder and involved the lateral superior and anterior surfaces, cutting wide of the tumor necessitated excising the bladder wall along the edge of the prostat for a distance of about one inch. Naturally the bladder wall could not be coapted at this point, so a triangular opening in the bladder remained the base of the triangle being the prostate and the apex the united bladder wall. An incision through the abdominal wall over this opening was then made to the right of the original median abdominal incision which was closed a drainage tube was inserted in the second incision and the wound treated as in suprapubic prostatectomy

CASE 3. Male married, age 4 ; referred by Dr B. H. Foreman of Tacoma. Diagnosis, carcinoma of bladder. Symptoms, hematuria, tenesmus, and pain when bladder as overdistended by blood clots.

Treatment Oudin current from December 9 0, to March, 9 , no improvement. March 9, 9 2, chloroform anesthesia, suprapubic incision, diagnosis, tumor inoperable except by total extirpation. March 5th, the patient consenting, the ureters were transplanted into lumbar region. April 3d, bladder extirpated.

Results. Recovery weight at time of operation, 140 pounds now pounds, general health excellent.

PRACTICAL POINTS TAUGHT THE OPERATOR

1 The advantages of operating in two stages, ureterostomy first. The shortest period of time advisable between operations is two weeks, though the resisting power of the patient to operative shock will govern this factor

2 The character of urinal should be determined before operation, measurements for same made and point of exit of ureters determined, so that no muscular movement will render the ureteral cups inefficient.

3 The points of exit selected should be marked with nitrate of silver before sterilizing the field of operation.

4. Approximately the best area for ureter openings is three inches from spine of vertebræ and one inch above top of crest of ilium.

5 *Urinal* Measurement of ureteral cups outer diameter 4½ inches, inner 2 inches circumference outer 13 inches, inner 6 inches. Theory of action Inflation of the pneumatic tube causes a vacuum, which holds the cups so close to the skin as to prevent leakage of urine or any escape of odor of same, yet does not interfere with motion, as is demonstrated by the patient following his vocation of attendant in the acute mania ward at state insane asylum.

6. Technique of transplanting the ureters Iliolumbar incision to save time, strip the peritoneum to the pelvis of kidney using the pelvis as a guide to the ureter free the ureter from its bed as low down as possible. Puncture the muscles in a slanting direction after the method advocated by Watson. Pull the ureter through then with a finger in the incision ascertain the direction of the ureter see that there is no kink or sharp curve that will produce back pressure. Confirm the position of the ureter by a flexible ureteral catheter The ureters in this instance were stitched to the skin, but the operator would not advocate this method, later

experience causing him to prefer the method advocated by Rovsing—that of allowing the ureter to remain free projecting beyond the external wound, the atrophied portion to be cut off after the ureter has become fixed.

7 An early diagnosis permitted the sexual function to be preserved, by leaving one and one half inch of bladder wall on the right side. The right seminal vessel was dissected from the bladder, the prostate was left and covered with healthy bladder wall the sexual functions of the patient are now normal.

8. The pelvis was well packed with strips of packing gauze to the extent of filling the space left by the bladder so as to prevent intra-abdominal pressure from separating the edges of the excised peritoneum moreover, permitting the area to granulate up the obliterated cavity caused by the extirpation of the bladder thus preventing enteroptosis and its sequelæ.

There are many other points, some theoretical and others of practical interest to be learned from the study of this case, but their value becomes evident only when presented in detail. They are, for instance

1 The reason for selecting the opening for the ureters at points three inches from the spine and one inch above the crest.

2 The method of keeping the urinal clean, how it should be applied, the cost, etc. as viewed by patient and physician.

3 The explanation of the psychological fact that the patient always feels the sensation of urination when he empties his urinal Is it due to the fact that the position of the urinal permits him to empty same by simply unbuttoning his trousers as he did before the operation?

4 The fact that on kidney (the right) secretes phosphates continuously so as to incrust the urinal the left does not.

5. The left kidney (infected) was cleared by treating the pelvis as one would the bladder in cystitis—by irrigation with boracic acid and instillation of argyrol.

6. The report on the functional activity of the kidneys, which have been frequently tested.

7 The X-ray plates of the ureters, pelvis of kidney and also the urethra

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ON THE BLOCKING OF INFRA-ORBITAL AND MENTAL NERVES AT THEIR FORAMINA TO INDUCE OPERATIVE ANÆSTHESIA IN THEIR CUTANEOUS DISTRIBUTION

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WITH the advent of nerve-blocking appear papers that deal with the subject in general but few that detail the applied anatomical technique. I recently proposed[1] infiltration of the lingual nerve, both for temporary anæsthesia in operations in the anterior two-thirds of the tongue and for permanent relief of chronic pain as in inoperable carcinoma. Also I proposed infiltration of the auriculotemporal nerve for operations upon the pinna and external auditory canal. The following cases illustrate the title of this paper

BLOCKING OF INFRA-ORBITAL NERVE

Case C F male, white, aged 53, reported in the Surgical Out Patient Department of the University Hospital, in the service of Dr B A Thomas, August 5 9 3, presenting upon the lower half of the right side of the nose, just above the ala, an indolent epithelioma (rodent ulcer) of two years' duration It was the size of thumbnail, shallow and covered with dried blood crusts, removal of which provoked no bleeding It was decided to desiccate the ulcer with the high frequency spark, and the problem of anæsthesia presented itself On account of the denseness of the tissues in this situation, and on account of the lateral cartilage of the nose forming the floor of the ulcer infiltration was not feasible Being in the territory presided over by the nasal branch of the infra-orbital nerve, it occurred to the writer to block that nerve at its emergence from the infra-orbital canal Accordingly ccm of per cent solution of novocaine with adrenalin 1000 as prepared and drawn into syringe, the needle of which sought the infra-orbital foramen cm below the lower margin of the orbit and midway between the canthi The foramen was found without difficulty paræsthesia obtained, and the nerve blocked The external nasal branch of the ophthalmic nerve was then infiltrated at its emergence between the nasal bone and the lateral nasal cartilage A thorough desiccation as applied without any pain

Since the infra-orbital nerve supplies the upper teeth, it seems possible to infiltrate it in its canal for the relief of toothache and for the painless extraction of teeth Accordingly I injected this nerve with methylene blue in a cadaver exposed the canal by removing the orbital contents, and found that the solution had stained the nerve as far back as the sphenomaxillary fossa. I have had no opportunity of trying this method but in practice but mention it in the hope that it may prove useful.

BLOCKING OF THE MENTAL NERVE

Case M S male, white, aged 52, insurance collector was brought to me by Dr C. M Ewing of Philadelphia, presenting superficial ulcer 8 cm. in diameter (the size of dime) in the center of the lower lip, with its anterior border at the mucocutaneous junction. Duration, four years Surface of ulcer dry and it did not bleed readily Extended in depth to, but did not involve, the orbicularis oris Submental lymph nodes not palpable. Submaxillary enlarged on both sides to size of pea, but this was readily accounted for by the carious and tartared teeth, with their marginal gingivitis It was planned to excise piece for histological examination and, since the ulcer was so superficial and indolent, to desiccate the remainder with the high frequency spark. The patient was nervous and desirous of voiding pain, and requested that no needle be inserted near the ulcer Accordingly, it was decided to block the mental nerve, and as the ulcer occupied the center of the border of the lip, it was patent that both sides must be anæsthetized

A spot on the skin which lay before the mental foramen was sodiumed and infiltrated intradermically with drop of solution of per cent novocaine with adrenalin 1000 The hypodermic needle was withdrawn and minute later reinserted perpendicular to the surface of the mandible to seek the mental foramen The position of this foramen may best be understood by stating that in skiagrams of the mandible it can readily be mistaken for focus of disease just below the roots of the second premolar tooth More specifically it interrupts the external oblique ridge at about midway between the alveolar and inferior borders of the mandible. Its direction is downward, forward, and inward If the alveolus has been absorbed, due allowance must be made, for now the foramen lies close to the upper border of the mandible (basilar part) Its diameter is one sixteenth of an inch (5 mm) A finger of one hand was placed in the buccal cavity and followed the second premolar until halted by the reflection of the mucous membrane Thus was to assure against the needle entering the buccal cavity as an atrium of infection Entrance of the needle into the foramen was signalized by its sudden drop and by paræsthesia of the nerve. One ccm of the same solution was injected The opposite side was similarly treated Perfect anæsthesia in the distribution of both nerves was almost immediately obtained A piece of ulcer was excised and the remainder desiccated with long, deeply penetrating high-frequency spark without any pain whatever A minute branch of the inferior coronary artery was cut, but the oozing was readily checked by pressure with cotton saturated with strong solution of permanganate of potash mixed with adrenalin

So perfect was the anæsthesia that I could readily have removed the ulcer radically and performed cheiloplasty particularly since there was no patent metastatic carcinoma of the submental

[1] Journ J Am M Ass 1913, lx, 1040
Surg Gynec & Obst 1911 xvi,
Boston M & S J 1911 Oct

lymph-nodes to take me beyond the anesthetized area. For the removal of these cervical lymph-nodes it is feasible to block the second cervical nerve at the middle of the posterior border of the sternomastoid muscle.

The dental branches to the incisor and canine teeth may be blocked through the mental foramen, and since both nerves supply six teeth, genuine painless dentistry would be realized for nearly one-fifth of all the teeth, and at least for the most sensitive ones. Toothache in any of the six may be readily relieved.

MANAGEMENT OF LABOR IN CASES WITH RELATIVELY CONTRACTED PELVES

By NEVIL M. GARRETT, M.D., Fellow Kentucky

A SUSPICION of pelvic deformity is aroused by smallness of a woman's stature, by a waddling gait, and by malformation of her limbs or spine also, in the case of a primipara, by a pendulous abdomen and by the fœtal head not being fixed at the brim at the commencement of labor and in a multipara, by a *history of previous tedious and instrumental* labors."

The presence of one or more of the above symptoms should not be taken as positive evidence that the pelvis is contracted, but when seen before the onset of labor they do call for an investigation of the case that an idea of the size of the pelvis may be formed.

I believe it to be good practice to make a *digital examination of all obstetrical patients*, at least a month before the expected confinement, even though the patient be a multipara who has borne several children without particular trouble. Such a patient may now have an abnormal growth in her pelvis, which will render delivery at term difficult or impossible. Such a growth may have been present at the time of the last delivery and have been of such small size as to have caused no particular trouble, but since that time may have attained such size that we will be compelled to reckon with it.

In all primiparæ, and those multiparæ whose last labors have been particularly difficult, we should form an idea as to the size of the pelvis by the use of the pelvimeter.

The diameters of the most practical importance are the internal conjugate, external conjugate, interspinal, intercristal, transverse of outlet, and anteroposterior of outlet. A marked diminution in the interspinal and intercristal diameters leads to the suspicion of transversely contracted pelvis. If the intercristal diameter is no greater than the interspinal, or if it is less, the pelvis is probably rachitic. A notable diminution in the external conjugate shows that we have to deal with a flattened pelvis. If the three principal external measurements are unusually short, but are in the normal proportion to *each other they indicate a generally contracted* pelvis, which is the most common variety in the United States.

Inasmuch as the size of the pelvis constitutes only one factor in labor, a woman may give birth to one or more children at term without difficulty and with another be the subject of a contracted pelvis, owing to the size of the child's head. We can form some idea as to the capacity *of the pelvis but we have no accurate way of* determining the size of the fœtal head.

The normal internal conjugate diameter, or conjugata vera, is four and three-eighths inches, and is the shortest distance between the anterior surface of the sacral promontory and the posterior surface of the symphysis. It is the available anteroposterior space at the inlet for the passage of the fœtus.

Unfortunately, we have no satisfactory method of measuring this diameter and usually rely on the measurements of the external conjugate or the diagonal conjugate which is taken by measuring the distance from the sacral promontory to the lower margin of the symphysis and subtracting from five-eighths to three-fourths inches, according to the height and inclination of the symphysis. Any material shortening of the true conjugate constitutes a pelvic contraction.

In studying the treatment of this condition it is well to divide the contraction into the following degrees. That of major contraction, where the conjugata vera is below three inches, medium

contraction, where it is from three to three and three-fourths inches, and minor contraction, where it is from three and three-fourths inches to normal.

Statistics show that about 75 per cent of women with contracted pelves, where the contraction is not absolute, will have spontaneous deliveries, or at least be delivered without major surgical procedures. "Naturally up to a certain point, spontaneous delivery gives the best results for mother and child. From that point, however the prognosis becomes less favorable." Cases have been recorded of spontaneous birth through pelves whose internal conjugate diameters ranged as low as two and three-fourths or three inches, but such cases are rare. In flat pelves of three and one-half inches, and generally contracted ones of three and three-fourths inches, there is great probability of spontaneous delivery but below these figures the chances become less as the size of the conjugate decreases.

In the major and minor degrees of contraction there is not so much room for discussion as to treatment, as the latter *if* given sufficient time, will nearly all deliver themselves, some possibly requiring version or the use of forceps. Major cases at term, with viable children, practically all require cæsarean section. The cases allowing the greatest difference of opinion as to treatment are the moderately contracted ones, ranging from three to three and three-fourths inches.

The treatment of such cases varies with different individuals. The doctor who has had several cases, all of which have had spontaneous normal deliveries, naturally does not look upon a relatively contracted pelvis with the same degree of concern as does one who has lost a patient from rupture of the uterus in the same condition.

The principal methods of treatment are

1. Premature labor at about the thirty-sixth week.

2. Test of labor at term, followed, if necessary *by forceps or version, and in the event of* failure to deliver by forceps, this is followed by pubiotomy or cæsarean section.

In the event that version is unsuccessful, craniotomy will most likely be indicated, as the child usually dies unless delivery is rapidly completed when this method is employed.

3. Cæsarean section.

The author has sent the following questions to a number of obstetricians and surgeons.

Number of cases observed?

Where you have charge of the case primarily what method of treatment do you prefer?

Do you consider the high forceps operation justifiable?

In cases that have been allowed to go to term and *cannot be otherwise delivered, do you prefer* cæsarean section or pubiotomy?

Which operation has the greater mortality?

What has been your experience as regards union of the bone after pubiotomy?

Fifteen of those addressed replied, but seven failed to supply suitable statistics. However the remaining eight reported enough cases, including the small number observed by the writer to make a series of 2,935 cases. The number of cases reported in most instances is approximate, as most of those replying were unable to give the exact number. I feel sure that many cases of absolute contraction were also included.

In reply to the question, "Where you have charge of the case primarily what method of treatment do you prefer?" three prefer test of labor at or just before term, three prefer induction of labor at about the thirty-sixth week, while one prefers cæsarean section, unless spontaneous labor or low forceps is probable.

Practically all agree to the high forceps operation under varying conditions, in expert hands. One says that it is never justifiable in first labors and one prefers version.

In reply to the question "In cases that have been allowed to go to term and cannot be otherwise delivered, do you prefer cæsarean section or pubiotomy?" four, representing 305 cases, prefer cæsarean section, while four others, representing 2 625 cases, prefer pubiotomy under certain circumstances.

Replying to question 5 five say that cæsarean section has the greater mortality while two say that pubiotomy has.

Replying to the question, "What has been your experience as regards union of the bone after pubiotomy?" practically all of those who have had experience with the operation, are satisfied with this phase of it. One who opposes *pubiotomy* says that union is occasionally faulty. It appears that bony union is not essential. In fact, the majority have fibrous union, which may be an advantage in the event that the patient again becomes pregnant.

Just here I *think* it well to quote exactly the answers of some of those reporting the largest number of cases.

J. Whitridge Williams, who reports upwards of 2,000 cases, says

As over 75 per cent of all cases end spontaneously my conduct in the relatively contracted pelvis is extremely conservative. If the conju

gata vera is above 7 5 cm., I wait for a spontaneous outcome in primiparous women, unless the child is unduly large while in multiparæ I interfere primarily only when the history of past pregnancies indicates the probability of serious dystocia, or when the head is so large as to make it improbable that engagement would occur

"If spontaneous labor does not occur after a reasonable test of the second stage, I believe that in such cases pubiotomy should be done, provided the mother and child are both in good condition at the time the operation is considered. Under these circumstances, I and my assistants have done between 50 and 60 consecutive pubiotomies without a death. My reason for preferring pubiotomy late in labor to cesarean section in the type of cases under consideration is that the former has a mortality of only 1 or 2 per cent, whereas the latter has one of from 8 to 10 per cent. In my experience ideal results are obtained from the classical cesarean section only when performed at an appointed time at the end of pregnancy or in the very first hours of labor its mortality appearing to increase with every hour labor continues.

In the great majority of my pubiotomies there has been fibrous instead of bony union. This I regard rather as an advantage, as in not a few cases it leads to permanent enlargement of the pelvis and obviates the necessity for interference in future pregnancies. All of my patients have been seen since operation and both they and I are pleased with its ultimate result.

Do not misunderstand my advocacy of pubiotomy I regard it as a makeshift operation to be undertaken in cases in which we have overestimated the powers of Nature or underestimated *the size and consistency of the fœtal* head. It is an operation to be undertaken only after a test of labor If we feel sure in advance that interference will be necessary cesarean *section done early is the proper treatment.*"

A. J Rongy reporting approximately 300 cases, in answering question 4, says

Depends whether or not the case is supposedly infected This is determined, as far as possible, by the study of each individual case. The deciding factors usually are The amount and character of manipulation the patient had, the competency of the physician or midwife length of time in labor general condition of patient, such as degree of exhaustion, the character of pulse and temperature

If the condition of the mother is such that abdominal section and with it, the entrance into the peritoneal cavity is considered an *additional danger to the mother* cesarean section is eliminated and pubiotomy then becomes the operation of choice."

J Clifton Edgar reporting several hundred *cases in twenty five years," prefers* pubiotomy in funnel pelves and contracted outlet, and in most cases with engaged head.

Theodore J Doederlein, reporting about 20 to 30 cases, says

"I perform pubiotomy in secondary cases, i.e. cases that have gone through the hands of midwives, etc. Cesarean section in primary that is, clean cases.

Carey Culbertson reporting about 275 cases, prefers cesarean section. He says that "pubiotomy should be complementary to cesarean section, and not an operation to take its place. The field of pubiotomy is strictly limited."

Treatment. The induction of premature labor at or after the thirty-sixth week, has much to commend it in certain cases namely where the contraction ranges from three and one half to three and seven-eighths inches, and where the circumstances are such that the child will have proper care and nursing The induction of premature labor — undertaken not before the thirty-sixth week, under the most rigid aseptic technique — should have practically no maternal mortality and while most authors place the *fœtal mortality high, if the method be followed* only in cases with a true conjugate of not less than three and one-half inches, and done from two to four weeks before the expected termination of pregnancy, *the fœtal and maternal* mortality considered jointly should compare favorably with the other methods of delivery

Podalic version has been employed in *contracted pelves, but it gives a high fœtal mortality* and if good maternal results are to be obtained, the procedure has to be undertaken soon after rupture of the membranes, before we have given nature sufficient time to see if she can effect delivery with the head presenting, therefore, if version be generally employed in this condition, many cases would be subjected to it, with a resulting high fœtal mortality which if left to nature might terminate spontaneously

If the contraction is below three and one-fourth inches and has been allowed to proceed beyond the point where premature delivery might have been most indicated, then cesarean section is the operation of choice, if seen early enough that is, before or at the beginning of labor and before the patient becomes exhausted and probably infected. *If the true conjugate is three and one-*fourth inches or greater and the head can be made

to enter the pelvis, then the patient should be given a test of labor at, or before, term using extreme care to prevent infection and allowing reasonable time for the head to mold. If after a reasonable test of the second stage, the head cannot be made to engage, with the patient in the Walcher position, then a trial may be made with the forceps, but great care should be exercised in their application and use and if no progress is made after two or three attempts they should be left in position and a publotomy performed, after which delivery may be completed with the forceps.

Publotomy should never be selected as the operation of choice where it is apparent, before labor that major surgical interference will be indicated, but in those cases that have been allowed to have a test of labor and cannot be delivered by the reasonable use of forceps, it is indicated if the mother and child are both in good condition. It is especially indicated in those cases where the head is impacted low in the pelvis and where the outlet is contracted.

In the event that cæsarean section is undertaken upon a case which is supposedly infected at the time, it will probably be better to remove the uterus at the same time.

Craniotomy upon the living child, if ever justifiable, is so in exceptional circumstances only but if the child is dead and the contraction is not below two and one-half inches, it is the method of choice, provided delivery cannot be easily affected by version or forceps.

The tendency at present is to regard craniotomy upon the living child as never justifiable. This is a point which each one must decide for himself, but looking at it from a purely human point of view it probably is justifiable in sections remote from trained surgical help where both mother and child will probably die unless something is done. However such instances must be rare in this country

Some authorities believe in craniotomy where a markedly hydrocephalic head is the cause of dystocia, and also advocate inserting the instrument to the base of the brain in order to be sure that the child may be dead when born.

In such cases it may be justifiable to make a puncture sufficient to allow the fluid to escape but to me it seems absolutely unjustifiable to go further unless the exigencies of the delivery require it. It is not our province to rid the family of an undesirable member at this stage any more than it would be after its advent into the world.

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TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD DECEMBER 19, 1913, WITH THE PRESIDENT, DR. FRANK W. LYNCH, IN THE CHAIR

DR. WILLIAM M. THOMPSON reported three cases as follows:

CASE 1. Adenocarcinoma of the uterus. A woman aged 39, weighing 200 pounds, with history of two miscarriages and three normal labors. Menstruation had been regular and up to a year previously had lasted only one day. Four months before July 1, when she was first seen, she had been having intermittent hemorrhages lasting about five weeks. For a period of the previous three months the hemorrhage had been almost continuous. Physical examination showed an enteroptosis, the gynecological examination showed pale, relaxed vagina and pelvic floor; the cervix was negative except for a stellate laceration; the uterus was the size of a six-weeks' pregnancy at this and on three subsequent examinations. The cervix was hard and small, tubes and ovaries were negative; the body of the uterus was quite solid, and there could be felt in one corner a distinct mass. My diagnosis as between some retained decidua, although pregnancy was denied, and malignancy. I did a blunt curettement one day and hysterectomy the next. The cervix as normal except for a bleeding vessel opening into the internal os, but up in the fundus was quite a mass, which presented a typical picture of adenocarcinoma of the fundus. The pathologist's report showed in the body of the uterus a fungating, bleeding, friable mass attached to the endometrium by a broad base. Sections through this mass showed no sharp line of demarcation between it and the tissue forming the muscular walls of the uterus.

CASE 2. A case of carcinoma of the intestine with chronic obstruction in a young girl aged 3, with no significant past or family history. Two weeks previous to being seen she had severe, sharp, intermittent pain in the stomach, with diarrhea. Her physician had made a diagnosis of retroversion and put in a tampon. The pain continued, and the following day the menstruation came on; the pains are described as lancinating, extending clear up through the abdomen. She had had diarrhea for a month, and at no time had formed stool. Examination showed a tumor in the right iliac fossa extending up to the splenic flexure and across the abdomen above the umbilicus. This was a fecal impaction. The uterus presented about an inch above the symphysis and was displaced forward. There was a bulging of Douglas' pouch. A median incision was made and a tumor extending throughout the whole length of the pelvic sigmoid was found. The tumor lay behind the uterus. There were no adhesions, but some metastases in the peritoneum. The mesentery was so long that it was easily possible to raise the tumor through the abdominal wall. The method used was to excise the tumor three inches above the mass and about three inches below and amputate the mesosigmoid. Into the upper end of the bowel a rubber tube ½ inches in diameter was passed and fastened with a purse-string suture, one stitch going through the tube. The other end of the tube was passed through the distal end of the bowel and out through the sphincter, and then the upper end was invaginated into the lower and united by interrupted sutures. The sphincter was dilated. About six inches above the resection a lumbar colostomy was performed by the two-step method. On the second day the colostomy was opened with the cautery. A large catheter was passed into the transverse colon and warm olive oil injected, for four days. At the end of four days the woman had an enormous bowel movement, weighing about five pounds. The colostomy gradually closed.

The pathological report was as follows: Chronic obstruction, carcinoma of the sigmoid flexure; ulceration, the edges of the ulcer being composed of connective tissue, with which are found very small masses of epithelial cells. The masses extend in the submucosa far underneath the normal mucosa, and in many places the degeneration left large masses of mucus with a few pale nuclei here and there. Carcinoma of the sigmoid.

CASE 3. A large, ignorant woman weighing, in July 1912, 200 pounds, 35 years of age; a widow with no children. Menstrual history was regular until two months before the time of consultation, during which she had flowed two weeks and stopped, had begun again, and was flowing at the time of consultation. She had four sisters, all of whom had been operated on for pelvic disease, but none with infection. They had either fibroid tumors or ovarian tumors and prolapsus. The woman complained of prolapse of the womb. The abdomen was large; there was fluid in the flanks, and a large tumor reaching half way between the umbilicus and the ensiform. The tumor had the consistency of cystic myoma — more solid than otherwise. The cervix presented at the vulva.

She was operated on July 18 and the tumor removed, with the uterus. The tumor as called in the operating room pseudomucinous cyst of the left ovary. It was attached to the omentum at its lowest point and the omentum was excised two or three inches above the attachment. The woman did well for a year and then she reappeared. The pathologic report showed a cyst having a capacity of about 300 ccm. with many small cysts in the wall extending into the cavity. The cysts contained substances of varying character — the largest of a thin, clear character, smaller ones of mucoid character and one of thick caseous material containing hairs. The microscopic preparations showed papillomatous cystadenoma with epithelium, hair and adipose tissue. The upper part was pseudomucinous cyst, the lower part was a solid cyst and contained dermoid material.

The second time I saw the patient she had an enormous abdomen with a great deal of ascites and complained of a return of the prolapse. I opened the abdomen and there appeared to be carcinomatous mass in the omentum. At the same time epithelial papillæ were dotted all over the

parietal and lateral peritoneum, and masses of papilla floating in the fluid. The abdomen was closed after removing the omentum almost entirely leaving portion in the region of the splenic flexure and fixing the uterus to the abdominal wall. The woman was put back to bed and given over to X-ray treatment for while. That was the last of June. The pathologist report was that the specimen consisted of tumor mass about the size of hen's egg embedded in mass of omental fat covered with smooth, shining peritoneum. The cut surface shows fatty tissue striated ith grayish whit fibrous tissue. Histologically this section consists of an areolar fatty tissue containing ithin it trabeculæ of connective tissue of cellular type in some places almost resembling spindle-celled sarcoma. Within this connectiv tissue, which varies greatly in amount in various places, are found epithelial masses in the form of acini of exceedingly irregular shape and size in some places lined with multiple layers of epithelium of cuboidal type — metastatic carcinoma of the omentum.

The next time she appeared, in April, the X-ray man found the tumor mass in one side had been reduced. I advised against operation. In October she returned with urethral caruncle, ascites, and umbilical hernia. The caruncle was removed and the woman put to bed. This specimen was large like polyp. It consisted largely of granulation tissue in which there as found mass of squamous epithelium, irregular in outline, the tissue cells containing many mitoses. Urethral caruncle carcinoma (?)

At the next operation, in January, the right ovary as removed, which at first operation was normal. It was found to be carcinomatous, about the size of large orange. The carcinoma in the splenic flexure as smaller and the small papillæ of the peritoneum ere also smaller and were hard instead of soft.

This woman undoubtedly had carcinoma in the first cyst, that had been overlooked. It is a matter of common knowledge that the majority of cystic ovarian teratomata are innocent tumors, while on the other hand solid ovarian teratomata are of intense malignancy in rading surrounding structures and giving rise to metastatic deposits. Up to 1913 there had been nineteen similar cases reported.

Dr. N. S. Heaney reported the case of birth of monster in woman aged 33, who had alway been extremely healthy, and was pregnant for the first time after six years of married life. The husband had living healthy child years old, from previous marriage. The patient felt unusually ell during pregnancy until the t enty eighth week. The uterus had corresponded in height with the period of amenorrhœa until the twenty-eighth week, hen there was rapid increase in size, associated with marked pain. Heart sounds of one fœtus only were found. Because of the frequent association of twins and fœtal anomalies ith hydramnios, an X-ray was taken by Dr. Potter. The picture showed one fœtus, hich was very small for the thirtieth week. The vertebræ and femurs were plain, but no cranium showed. The patient, two days after the examination, suddenly had gush of ater and delivered herself ithin twenty minutes. (The product of conception was exhibited.)

Examination of the female fœtus shows multiplicity of abnormalities. It is an anencephalus, the brain bes entirely free, the cranial vault being absent only one eye is present, the brain protruding through the other orbit, the nose is only little bud, the cord is adherent t the brain membranes, the left arm is adherent to the neck of the fœtus, the right arm is short and markedly deformed; the heart, liver, intestines, spleen, in fact, most of the abdominal organs be outside of the abdominal ca ity; also there is double club-foot. It was born dead.

Dr. Eugene Cary, in discussing Dr. Heaney's case, asked whether the chorion and amnion were attached. Dr. Heaney said that as far as could be made out macroscopically they were attached. The amnion could not be separated from the chorion in the parts examined.

Dr. Cary said he had asked the question because on the head of the fœtus where the cord is attached to the brain and on the side of the neck where the arm which shows the greatest deformity was attached, there seemed to be a kind of membranous band. It is interesting to note that in several cases with malformations of the fœtus which have been reported by Stechel, who has collected 15 cases, the amnion was ruptured and there were found a number of adhesions of the amnion to the fœtus and he and others believe that that is caused by the adhesion of the amnion and in this case that may explain these abnormalities. Dr. Heaney's case is also of interest because there have been only three or four cases in which abnormalities of the fœtus associated with hydramnios were found. He had a case to report also in which hydramnios was responsible for the condition, but there were no malformations but in the case reported by Ahlfeld, hydramnios was responsible for club-foot, and in two or three other cases hydramnios caused some malformation, but in none of them were any adhesions found.

Dr. Heaney: The chronic hydramnios of the last weeks of pregnancy is not associated with a high percentage of fœtal abnormalities, while the so-called acute hydramnios of the earlier months is so frequently associated with abnormalities of some sort — hydrocephalus, spina bifida, anencephalus, exencephalus, and deformities of the upper part of the central nervous system — that it is inadvisable to make especial attempts to prolong pregnancy. The earlier the hydramnios occurs the more frequent and greater the percentage of fœtal anomalies.

Dr. Reed: I should like to ask Dr. Carey if some recent development in histology has discovered the covering of the cord to be amniotic. My idea was that there was no amniotic covering of the cord.

Dr. Cary: Not that I know of. I had in mind where the amnion reflected up on the cord from the placenta.

Dr. Arthur H. Curtis read a paper on "Bacteriology of Leucorrhœa" (see p. 399) and exhibited microphotographs and microscopic slides of the bacteria found in leucorrhœa.

Dr. T J Watkins: My ideas have changed materially in regard to this subject since Dr Curtis has been making these examinations. It has been a source of surprise to find how few of these patients had any discharge from the uterus. The majority had a discharge of clear mucus from the cervix, occasionally a thick yellow plug.

The study in regard to the reactions of the discharge would seem to show that what has been written in regard to the vaginal and uterine cases is chiefly imaginative. Practically nothing of any interest has been found in the discharge relative to reaction. They are practically all acid, some rather weakly acid or nearly neutral.

It would also seem that much that has been said in regard to the relation between the general elimination anæmia, and vaginal leucorrhœa is a matter of guess-work rather than of accurate observation. Many of these patients are in good physical condition, with good elimination, and attention to the eliminative organs has had practically no effect on the leucorrhœa.

The question of diagnosis is interesting. I find that heretofore I have been considering many of these cases gonorrhœal which were not. We were fortunate in having a number of cases in which there had been no gonorrhœal infection (in all these cases we have had conferences with the husband), and I know in some of these cases the husband has had no gonorrhœa, and there has been no suspicion that the wife had gonorrhœa and yet these cases, diagnosed according to the superficial methods of examination heretofore used, would be pronounced gonorrhœal cases. In the diagnosis we have had no cases in which the examination of Skene's ducts has been of much service. In only a small number was a discharge found in Skene's ducts, and we occasionally found gonococci in these. It is difficult to determine what is a normal Skene's duct and what is an infected duct. These investigations also show that an examination microscopically of the discharge, to see whether the gonococci have disappeared, is of no use, because the gonococci disappear in all cases, irrespective of treatment.

Dr. C S Bacon wished to ask Dr Curtis whether all these examinations had been made on non-pregnant women or whether some of them included leucorrhœa in pregnant women and also whether he had attempted to classify the discharges according to their physical characters into more or less liquid or fluid discharges and thick, cheesy discharges, and if so whether the flora differ in the different kinds of discharges.

Dr. Heaney wanted to ask whether this had been a study of the vaginal secretions, or a study of cases of leucorrhœa, or did Dr Curtis distinguish between cases of leucorrhœa and excessive vaginal secretion. Is it required that a smear have a leucocytic content in order to call it leucorrhœa, or does the intensity of the secretion, if otherwise normal in character constitute a leucorrhœa? For instance, we may find in chlorotic young girls a secretion intense enough to stain the clothes, but which does not contain leucocytes or other apparent abnormalities. Dr. Heaney was surprised at the few cases in which Dr Curtis found a visible purulent discharge from the cervix microscopically showing leucocytes. Where does the vaginal secretion come from. Is it mucus from the cervix that is altered in the vagina by organisms, or is it an exudate from the vaginal walls.

Dr. Goldstone said he had held the thought expressed by the last speaker that we need to recognise a more or less physiologic discharge that is not at all the result of infection and if they are copious they may become impregnated with certain bacilli, such as the Doderlein, as physiological or normal condition. Many women and young girls have what is called a catarrhal condition a rather excessive vaginal and cervical secretion, perhaps intra-uterine. If there is no such thing as an intra-uterine discharge, he should be glad to learn that fact. But he would like to know whether there is not such a thing as a physiologic discharge that may become excessive under certain conditions, as pelvic hyperæmia induced by sedentary employment, by insufficient menstrual discharge, by sexual excitement, or by displacements. He had repeatedly seen a leucorrhœa stopped by righting a retroverted uterus. In regard to the gonococcus, that prepares the way for many affections, chiefly among those who have been pregnant. Whether it is the right thing to teach that as long as we can find the gonococcus under the microscope we should not interfere with nature processes, and after it is no longer recognizable by the microscope we should institute our surgical relief, is a question.

Dr. Robert T Gilmore said in regard to treatment, which Dr Curtis had just touched in regard to bacterin therapy we all know of the treatment by silver salts and the persistency of these leucorrhœal discharges, and how useless it is to give douches he would like to know where

Dr Curtis obtained his autogenous material, and also whether he has had any results with the Bulgarian bacillus in these cases.

Dr. Curtis, in closing said it was difficult to classify all these infections according to whether the woman is pregnant, whether she had gonorrheal infection, whether it was a mucous discharge, a purulent discharge, or no discharge. He had studied only 85 cases, and had hoped merely to open the way to a study of the trouble from which something of practical value might be developed. A small amount of discharge exists in every woman, whether married or not this consists of a small amount of transudate and epithelial cells, together with the Doderlein bacillus, which is normal As soon as there is a mucous discharge there is a pathological condition. His subject was chronic leucorrheal conditions, which he attempted to limit to purulent discharges which contained leucocytes. He did not discuss cases in which there was a discharge from the cervix due to hypertrophy erosion, or eversion. Mucus makes an excellent culture medium. A woman with such a discharge has an increase of the normal Döderlein bacilli, with complications depending on the amount of discharge and the amount of accompanying inflammation extending through all gradations up to a profuse purulent discharge which is characteristic of marked cases of leucorrhœa. He had not formed any opinion about women who are pregnant. The cheesy discharges come from virgins, and usually contain the Döderlein bacillus only Leucocytes are unusual. During menstruation the only difference is that there is an increase in the culture medium and a temporary increase in the organisms. Examination of the mucus plug in the cervix for leucocytes gives little information of value, because of the tendency to contamination from pus-covered adjacent vaginal walls.

With Dr. Gillmore's permission it seemed best to postpone all discussion of treatment until it can be taken up in detail.

BOOKS RECEIVED

Books received are acknowledged in this department, and such acknowledgment must be regarded as sufficient return for the courtesy of the sender Selections will be made for review in the interests of our readers and as space permits

Principles of Surgery By W A Bryan, A M M D Price, $4 00 net Philadelphia and London W B. Saunders Company 913

An Introduction to the History of Medicine By Fielding H Garrison, A B, M D Price, Cloth, $6 00 Philadelphia and London W B Saunders, 914

Surgical Diseases of Children By Samuel W Kelley, M D LL D Price $5 00 New York E B Treat & Company 914

Anatomy and Physiology — A Textbook for Nurses By John Forsyth Little M D Price $ 75 net. Philadelphia and New York Lea & Febiger, 914

Précis de Radiologie Pratique By André Lomon and Camille Hahn Paris Société d'Editions Scientifiques et Médicales, F Gittler Directeur 913

The Human Body and Its Enemies A Textbook of Physiology Hygiene and Sanitation By Carl Hartman, B A M A and Lewis Bradley Bibb, B A M D Price, 65 cents Yonkers-on Hudson New York World Book Company 913

Report of the Proceedings of the English-Speaking Conference on Infant Mortality Price, 2s net London National Association for the Prevention of Infant Mortality and for the Welfare of Infancy 913

First Book of Health By Carl Hartman, B A M. A and Lewis Bradley Bibb B A M D Price, 65 cents Yonkers-on-Hudson New York World Book Co

The Principles and Practice of Gynecology By E C. Dudley A M M. D Price, $5 00 net. Philadelphia and New York Lea & Febiger 913

On Diseases of the Rectum and Anus. Including the Sixth Edition of the Jacksonian Prize Essay on Cancer Fourth Edition. By Harrison Cripps F R C S. Price, $3 5 New York The Macmillan Company 914.

Diseases of Women Medical and Surgical Gynecology By Charles A L Reed, A. M., P C. S M. D New York and London D Appleton and Company 913

A Treatise on the Diseases of Women. For Students and Practitioners. By Palmer Findley, B S M. D. Price, Cloth, $6 00 net Philadelphia and New York: Lea & Febiger 913

Surgery of the Upper Abdomen. By John B Deaver M. D Sc. D LL. D and Astley Paston Cooper Ashhurst, A. B M. D Price, $5 00 Philadelphia P Blakiston Son & Company 913

Tumors of Abdominal Viscera By Professor Rudolph Schmidt and Joseph Burke, Sc. D M. D Price, $4 00. New York Rebman Company

Surgery of the Vascular System By Bertram M. Bernheim, A B M D Philadelphia and London J B Lippincott

Genito-Urinary Diseases and Syphilis. By Edgar C Ballenger M D Price, $5 00. Atlanta, Ga E W Allen & Co

The Stomach and Duodenum By Alfred E Barclay M A M. D B. C., M.R.C S. London Sherratt & Hughes

The Surgical Clinics of John B Murphy M. D Philadelphia and London W B Saunders Company

BOOK REVIEWS

THE SURGERY OF THE STOMACH Herbert J Patterson, M. D New York City Wm Wood & Co.

A review of this work of Patterson's has been one of the pleasures that seldom comes to those who make a discriminating study of books for the subject of review

It is seldom that one finds subject so clearly and concisely set down as is here done There is little or no extraneous matter the author discusses the work from a broad standpoint, yet at no place is there suggestion of verbosity It was prepared for the printer too early for comprehensive discussion of the use of the X-ray in the diagnosis *of obscure lesions, but otherwise the student will find* a complete résumé of the diagnosis and treatment of the various lesions, of the stomach.

Of especial interest is his discussion of anterior gastrojejunostomy which has to a certain extent fallen into disrepute in the United States His able defense of this procedure will serve to stimulate us to further investigation One concurs with him in the advocacy of the wide incision in every case in which the stomach is to be operated upon, for the sake of careful examination of the entire abdominal viscera

The author is not an advocate of the various types of gastropexy in gastroptosis, and one would like to have had a more extensive discussion of the subject than the author sees fit to give. As is natural the larger portion of the book deals with the subject of gastric and duodenal ulcers with their complications The value of this has been much enhanced by the extensive bibliography accompanying the various chapters.

In the after-treatment the early feeding of the patient by mouth is urged and severe condemnation is meted out to rectal feeding.

One reads with pleasure the chapters on duodenal and gastroduodenal ulcer in which the author, because of his careful observations and study of these cases, is particularly competent to speak.

The chapter on infantile pyloric stenosis gives the English rather than the American view of this condition in that he advises conservatism with operation as a last resort. *The good results obtained* by American surgeons in this class of cases leaves no doubt in our minds that surgical intervention should be the proper procedure The large series of cases by our own Scudder and Richter seem to have proven this

It is a pleasure to recommend this volume to every surgeon. It should be in the hands of every one who wishes to keep abreast of the best thought in gastric surgery

PRECIS D'ANESTHESIE LOCALE. Préface de M. le Prof Reclus By A Piquand, Ancien chef de Clinique à L'Hôtel Dieu de Paris Société d'Editions Scientifiques et Médicales.

This volume, designed for practitioners and students, is clear and precise, and while essentially technical is thoroughly comprehensible and advocates local anesthesia for many operations which previously have not been attempted except under a general anesthetic.

The first three chapters deal with indications and contra-indications for local anesthesia, anesthetic agents, and their chemistry Technique in general is fully discussed in subsequent chapters, also the special technique employed in the various regions of the body these being amply illustrated.

This book will be welcomed, not only by the student of local anesthesia but by the surgeon who, not having mastered the technique, is prone to belittle the possibilities of local anesthesia and employ general anesthesia many times to the detriment of the patient.

H. A. Potts

SYPHILIS AND THE NERVOUS SYSTEM. By Max Nonne, M. D Hamburg, Eppendorf. Translated by Charles E. Ball, B A M D Philadelphia J. B Lippincott Co

The second edition of Nonne's text Syphilis and the Nervous System is an up-to-date review of the latest investigations on this interesting subject. However there is no question but what this text has lost in value from the mere fact that it is a second edition The former book was written prior to the discovery of the Wassermann reaction, and also prior to Ehrlich work on The Chemo-*Bacterio-Tropic Therapy* These two important discoveries would of necessity require complete new text on the therapy and diagnosis of syphilis of the nervous system, and Nonne has only revised his text on these matters However, it is splendidly written The inductive method of arranging the work is particularly attractive The chapter on the pathology of syphilis could scarcely be improved upon. The chapter wherein the arguments for and *against the theory that tabes can only be* produced by syphilis is one which is a revelation to the average practitioner

Nonne has also taken up the discussion of hereditary syphilis, behavior of the Wassermann reaction, prophylaxis, salvarsan therapy the relationship of dementia paralytica to syphilis, and has given us splendid work on each of these subjects. His text is splendidly illustrated throughout, especially that *part relating to the pathology of nervous syphilis*

Treatment After Operation By William Turner M.S F R.C.S., and E. Rock Carling, B S F R. C.S. London University London Press, 9

This rather brief work is intended f r the general practitioner and the house surgeon. The authors place before you in a brief way certain principles regarding the care of a patient following surgical operation. They make no pretense to methods employed by other men but quote only their own experiences.

Practically every subject is d elt upon although some of them in a very inadequate way leaving much to the imagination of the reader

In discussing abdominal surgery the chapters begin with an enumeration of the various operations following this each one is taken briefly int consideration, outlining the ordinary care and the possible complications that might arise and how they should be dealt with.

The later part of the work consists of a rather detailed chapter on the eye by L. V Cargill F.R.C S This chapter takes up much more detail than the preceding chapters, minutely giving technique and dressings. This gives the work peculiar unbalance which is displeasing to the reader J A Wolfer

Diseases of the Rectum and Pelvic Colon Martin L. Bodkin, M D New York City D B Treat & Co

The tho has handled the subject in thorough, practical, and inductiv method W are first given an anatomical and physiological description of the rectum and surrounding structures, which is indeed very necessary t a thorough understanding of the pathological changes in this organ

Next the general examination, general diagnosis, and general symptoms are consecutively taken up. Malformations, catarrhal diseases sigmoiditis, proctitis, and the many other pathological changes, are discussed Following this, the special operations are given, together with such consideration of medical treatment as its importance merits There is special chapter discussing the relationship of rectal diseases to gynecology which is of interest and value. It is impossible to review in detail in the small space allotted the many valuable features of this work It must be sufficient to say that it is complete, not so voluminous as to be cumbersome, and very clearly and intelligently written

Tuberculin in Diagnosis and Treatment F M Pottenger A M M D LL D St Louis C V Mosby Company

Dr Pottenger has devoted this little volume t the defense of tuberculin The discussion which has continued since its memorable incipiency by Robert Koch is still continued Pottenger makes you feel that he would like t discontinue it and come out as an enthusiastic champion f tuberculin, yet in every chapter he gives w y to doubts and discussion, often inserting contradictory statements by other well-known uthors H ever the text is, as its name implies, devoted to a consideration of the value of tuberculin in diagnosis and treatment and as such mirrors wide experience and painstaking care. It is well written in language and argument that is easily understood. The author tells us t be circumspect and not accept negative tuberculin tests in face of other positive clinical findings. We are informed very intelligently as to the classes of cases suitable for tuberculin treatment and cautioned in every case to make use of all other therapeutic measures which are known to be of value.

The technique of administration, dosage, choice of preparation, method of dilution and preparation occupy at least one-third of the book and form an excellent working guide for the clinician who administers this much discussed and abused remedy

Collected Papers by the Staff of St Mary's Hospital, Mayo Clinic Contributions by twenty-three different surgeons. Philadelphia W B. Saunders Company 9 3

The student of surgery in the future will refer with great frequency t the various classes of surgical papers that have emanated from the Mayo Clinic. The present volume contains some of the most valuable contributions that have been published by the Mayo Clinic in the last few years. The ripened surgical experience f the Mayos has been supplemented in these volumes by many articles dealing with questions of surgical practice They have fortunately turned their attention to clearing up some of the moot questions by extensive study of their cases as exemplified by the articles of MacCarty and others

It is seldom that one can say as may be said here that every article in the volume is of pre-eminent importance, since there is no chaff but all wheat. We wish t congratulate the Mayos, not alone because of the great work they are doing in their clinics but because of their careful method of history taking and examination, which have made possible the presentation to the public of the experience they have gained t the operating table.

Cheyne & Burghard's Surgical Treatment, Volume V By Sir W Watson Cheyne Bart C.B D Sc., LL D F R C S F R S and F F Burghard, M S F R. C S Philadelphia and New York Lea & Febiger

The last volume of this series by Cheyne and Burghard includes the treatment of the surgical affections of the pancreas, liver and spleen, the neck, larynx, breast and thorax, and the genito-urinary organs including the kidneys

It is work intended t meet the demands f the practitioner rather than the student. Only enough space is devoted t the symptoms and pathology t render more intelligible the principles upon which the treatment is based and the various stages of the disease to which each particular method is applicable

There is a tendency throughout this text to indicate and discuss at length only one method of treatment, although other methods are frequently mentioned. This innovation of relieving the practitioner of the burden of reading discussion of many different methods of accomplishing the same result should be appreciated, for it is indeed rare among the compilers of systems of surgery

The illustrations are simple but useful, and it is to be regretted that many important points are left without illustrations where the use of them would greatly assist the reader to more complete conception of the text.

The book, intended for the guidance of the practitioner is very complete in detail with the possible exception of the portion devoted to after-treatment. This is one of the most important steps of surgery and it should be discussed clearly simply but fully since upon the after treatment depends to large degree the successful termination of operation

Pye's Surgical Handicraft Edited and rewritten by W H Clayton-Greene, B A M B B C, F R C S New York E B Treat & Co

There has been much added to this most excellent work, bringing it fairly well up to date. The subject of syphilis has been elaborated to include the technique of the Wassermann reaction and the salvarsan treatment

It is indeed difficult to select any one part as the best. As the name of this work implies, it deals in those very important details of surgery which require some ingenuity and acquired skill. Many minor points which are so essential to the young surgeon are discussed in such a logical and concise manner that it becomes a pleasure to read it.

The subject of splints and various appliances for the treatment of fractures and sprains is clearly outlined and illustrated and is well worth any surgeon's time to read.

The various minor surgical topics which confront the house surgeon, such as ulcers, frostbite, burns, abscesses, sprains and the various urinary disturbances and the like form a chief part of the scheme of this book. It is so common in the ordinary texts of surgery to find these very important subjects briefly and inefficiently discussed that it gives this work a distinct position in the surgical literature

Those diseases which require long and persistent treatment, with at times special appliances such as vertebral caries, and tuberculosis of joints in general are given a rather prominent place The eye, ear nose, and throat are also discussed in a very pleasing and efficient manner The teeth, regarding which the surgeon knows so little, are also included The treatment of different forms of poisoning, drowning, and other forms of suffocation are also given due consideration. The formulæ for enemata and various fermentations are taken up in a logical manner

After careful reading of the book one must truthfully say that it fills quite a unique place in the library of the surgeon and an indispensable place in the hands of the student, the young practitioner, and the house surgeon J A Wourts

Diseases of the Stomach George Roe Lockwood, M D. Philadelphia and New York. Lea & Febiger.

The author states that it is his intention to describe the diseases of the stomach as he has seen them and to present them from the standpoint of personal experience, and for this purpose he has grouped a series of cases and analyzed them He has faithfully carried out his purpose The volume as presented is a most valuable one to the student and gastric surgeon. It is much more comprehensive than the ordinary text-book that one would expect to find as the result of personal experience, since it is a volume of over six hundred closely printed pages. This has given the author a chance to discuss each of the various symptoms, signs, and conditions in detail at great length, and consequently the volume will be found of special value to the beginner in this special field of surgery although it can be read with profit by anyone

Because of its extensive discussion it should be considered a book rather than a monograph. The student will find it a means of ready reference in the various conditions confronting him.

Gynecological Operations, Including Non-Operative Treatment of Minor Gynecology. Hans Hartmann, M. D Translated from the French by Douglass W Stabold, M D Philadelphia P Blakiston's Sons & Co

In the preparation of this work, the author has endeavored to give a complete exposition of the diverse methods of treatment employed in gynecology Non-operative treatment is fully considered, as there is a general return to this branch of therapeutics. For this reason, much space has been devoted to minor gynecology mineral water cures, kinesitherapy and electrotherapy Special attention has been given to procedures of choice and to the large number of figures and diagrams, in an endeavor to clearly illustrate each stage of the various operations Throughout the whole text the author has shown painstaking exactitude in every detail of the varied divisions of his subject Nothing better can be said of this text than the following extract from the *British Medical Journal* in its review It is for the opinion of this experienced authority on disputed questions that the reader will most probably search his pages

Introduction à la Chirurgie Utérine Obstétricale By A Couvelaire, Assistant Professor Faculty of Medicine, Paris Paris G Steinheil

This work is divided into two parts first, the surgical anatomy of the uterus at term, during and after labor and second, conservative surgery of the uterus at term and in labor It consists in a series of plates, illustrating various phases of the uterus in pregnancy and in obstetrical operations, each plate

being accompanied by explanatory text. In Part I, these plates, for the most part, are photogravures in sepia, each accompanied by line drawing to aid in definition. The rest of the plates are half tone reproductions of wash drawings.

Part II consists of a fairly complete text, with bibliography describing the major surgical procedures involving the uterus in pregnancy chiefly the extra- and transperitoneal cesarean section and vaginal hysterotomy. This is also illustrated by full page plates in half tone.

The work is based upon preparations in the Baudelocque Clinic specimens dating back to the time of Champetier de Ribes and Varnier the surgical preparation having been made under the direction of Pinard. The feature of the volume consists in the plates, the author having been fortunate in securing the services of so accomplished an artist. The photogravures are not only scientifically exact but exquisite in creation and most skillfully reproduced.

CARL CULBERTSON

NEW ASPECTS OF DIABETES. Pathology and Treatment. By Professor Doctor Carl von Noorden. New York City: E. B. Treat & Co.

These lectures delivered at the New York Post-Graduate School upon diabetes give the present conception of the relation of diabetes to the other organs, as well as being an intrinsic discussion of the disease itself. While they do not cover the entire field they are of particular value in relation to the questions of modern research. The author considers that nervous influences stimulate the adrenals to an increased production of epinephrin, while the thyroid and hypophysis on the other hand are supposed to act by depressing the pancreas. These more or less theoretical deductions, while worthy of consideration, really add little to the definite understanding of this disease. The author lays particular stress upon the slight importance of glycosuria in certain phases of the disease. The chapter upon acetonuria will be found very suggestive.

MARRIAGE AND GENETICS, LAWS OF HUMAN BREEDING AND APPLIED EUGENICS. By Charles A. L. Reed, M. D., F. A. C. S. Cincinnati: The Gallon Press. 1913.

As set forth in the introduction, the objects of this volume are to overcome the ignorance which in too many instances keeps innocent victims from protecting themselves and their offspring from disease and degeneracy; to avert many of those conditions that destroy the possible happiness of the marriage state, and convert the bridal chamber into the anteroom of the divorce court. While covering an enormous field, the author has compiled a brief and concise statement of the principles underlying race betterment and that too without subjecting his reader to that moralizing and sermonizing which are so obvious in most popular treatises on this subject. It is written in terms for the lay reader yet the subject matter is so well formulated as to be attractive to the scientist desiring some systematic expression of the theme. Thus the doctrines of Lamarck and the discoveries of Mendel, of Weismann and of De Vries together with Galton's law are carefully set forth together with the author's series of ten fundamental laws of race perpetuation, designated as the decalogue of human breeding. In the immense amount of material recently produced on topics relating to marriage and sex by eugenic, this volume stands out as a definite expression to perform a definite service.

CARREY CULBERTSON

TEXTBOOK OF GENERAL AND SPECIAL PATHOLOGY FOR STUDENTS AND PRACTITIONERS. Henry T. Brooks, M. D. Philadelphia: F. A. Davis Co.

In the present-day making of books, we are having a large number that are really compilations of previous treatises, either in our own or some foreign language. It is a question as to how valuable such a book may be, although this is a translation of the work of Langerhans, which has been amplified by taking up the later developments in the field of pathology since the death of Langerhans. It is a concise and necessarily therefore, to a certain extent unsatisfactory pathology. This book may be recommended generally although if one searches for a special thing he is likely to find himself somewhat disappointed. The illustrations are mostly copied from other textbooks, particularly from the German and many of them are in color.

INFECTION AND IMMUNITY. By Charles E. Shoop, B. A., M. D. Philadelphia and New York: Lea & Febiger.

The day of the medicine bottle and the tablet box having passed our attention is attracted toward the more scientific and theoretical methods of treatment, immunology and vaccine versus serum therapy. Shortly the physician's drug store may be carried around in a little pocket case labeled vaccine and serum. However recent observation of Ehrlich would seem to indicate that in his opinion even the vaccinists and serum therapists have reached the limit of their usefulness. He recommends that more advancement be made along chemo-bacterio-tropic lines. The vaccine and serum therapists in turn say that the medicine internists of the old school never did cure anything with drugs except malaria and syphilis, and that all advancement along specific therapy has been by themselves.

Simon writes on the various phases of immunology and serum therapy with striking brilliance and it can be said without contradiction that his second edition is the most thoroughly up-to-date and reliable book yet written in English on this subject.

There are very interesting chapters on the offensive forces of the invading micro-organisms, and the defensive forces of the macro-organism, chemotaxis, the side-chain theory, anaphylaxis, active immunity,

tion, serum therapy, and the method of demonstration are discussed wherever applicable. A generous space is devoted to the diagnosis and treatment of tuberculosis. The text contains many splendid illustrations.

Abderhalden Investigations Concerning the Ferments of the Blood Cells and Tissues and Their Pathological Significance. Edited by Emil Abderhalden. Berlin: Verlag von Julius Springer. 9 3.

This second edition of Abderhalden's investigations concerning the ferments of the plasma and cell substance is of course of special interest to all those interested in the scientific side of this question, which undoubtedly in the future will be placed upon a much firmer basis than it is at the present, and it is to be hoped that organotherapy along this line will be removed from the uncertainty which now accompanies it and that one may employ it with the hope of sure results. The author discusses in comprehensive manner the ferments formed by the white and red corpuscles, blood and tissue cells, and lymph action. He discusses in detail serum of pregnant women, its value in determining pregnancy and other questions of like nature.

Diseases of Women. Enlarged and Revised Edition. George Ernest Herman, M.B., F.R.C.P., F.R.C.S. Assisted by R. Drummond Maxwell, M.D., F.R.C.S. New York City: Funk & Wagnalls Co. 9 1.

The comprehensive text on the diseases of women, for many years one of the most authentic in the British Empire is now in its fourth edition. The author, long a leading clinician produced a work which in its early forms showed considerable variation from the conventional text. His original aim, as frankly set forth, was to provide a book which should guide the student and practitioner to the diagnosis and right treatment of the diseases of women. Without regard to an formal classification, he endeavored to present the different organic affections in the way in which they appeared in practice. Thus the work was classified according to symptoms, a scheme which has some definite advantage from a purely clinical point of view, if confusing to the reader accustomed to the commoner anatomical arrangement. Hence after a few introductory chapters, chronic pelvic pain is discussed, then pelvic inflammation and next internal hemorrhage. Part V takes up hemorrhage in general and is followed by five short chapters on leucorrhoea. The disorders of menstruation and of the sexual functions come next, followed by urinary and rectal complications. The volume concludes with a complete presentation of abdominal tumors.

The arrangement is continued in the new edition, diagnosis and treatment again being emphasized. The greatest change in the present volume is seen in the part relating to operative technique, the portion of the work revised by Dr. Maxwell. Thus in the plastic work of the cervix and vagina and in radical extirpation for malignancy as well as in many other instances the revision has added greatly to the value of the book as a text.

Many of the illustrations are new, including eight in color. Another excellent feature is the index, divided into two parts, a general index and one of authorities, each much amplified.

Casey Culbertson

X-Ray Work for X-Ray Technicians. A. C. Christie, Captain, Medical Corps, United States Army. Philadelphia & London: J. B. Lippincott Company.

This manual by Christie is a condensed text on *the application of X-rays in diagnosis and treatment*. The book may be found very useful to the physician and surgeon in private practice especially so to those who are in the rural districts and who find it necessary to do their own radiography. One *commendable feature of the book is its brevity and* conciseness. X-ray operators are urged to make themselves familiar with the use and construction of the different forms of X-ray machinery and are shown the simplest method for obtaining the best *results. A careful study of this little manual will* greatly aid the operator in becoming proficient in this branch of diagnosis and treatment.

Lehrbuch der Frauenkrankheiten. Chirurgische Abteilung. Von L. Gelpke, M.D., and C. Sahlbach, M.D. Leipzig: Johann A. Barth. 9 3.

This work appearing in two volumes, is designed for both student and practitioner. The text is relatively short, yet complete and comprehensive and arranged in logical manner facilitating ready reference. Various theoretical problems are omitted, giving way to practical descriptions of surgical conditions and their causative factors, together with explicit suggestions as to treatment. The first chapters are devoted to the principles of general surgery including forms, acute and chronic infections, and tumors, and the following chapters are devoted to regional surgery. Many of the latest advances in surgical treatment are given, which bring the work up to date. H. A. Perry

Clinical Congress of Surgeons of North America

FIFTH ANNUAL SESSION

LONDON ENGLAND

WEEK OF JULY 27 1914

CLINICAL CONGRESS OF SURGEONS OF NORTH AMERICA

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THE LONDON SESSION OF THE CLINICAL CONGRESS

A LETTER FROM THE SECRETARY

I AM pleased to report that the plans for the organization of the London session of the Clinical Congress of Surgeons are now quite complete. In company with Mr A D Ballou the General Manager of the Congress, I arrived in London on January 19th and on Friday evening of that week met with the representatives of the London hospitals Sir Rickman J Godlee was asked to take the chair and I was given an opportunity of explaining in detail the methods employed in conducting previous sessions of the Congress After a general discussion of the plans it was moved by Mr McAdam Eccles, the representative of St. Bartholomew's Hospital, that the organization of the London Committee on Arrangements be completed by the election of an Executive Committee, which should have for its object cooperation with the Executive Committee of the Congress Included in the motion were the nominations of Sir Rickman J Godlee as Honorary Chairman, and Mr Herbert J Paterson and Mr Herbert S Pendlebury as Honorary Secretaries Mr Eccles motion was carried unanimously and Sir Rickman, together with Mr Paterson and Mr Pendlebury expressed their pleasure in accepting the appointments.

The representatives of the several hospitals then agreed to carefully canvass with their colleagues the situation in their own hospitals, and to prepare for early publication a preliminary tentative program of clinics and demonstrations, which is to be amplified and revised from time to time as the work progresses.

In the week following I had the pleasure of meeting Sir St. Clair Thomson, representing the surgeons specializing in laryngology Mr Arthur H. Cheatle, representing those specializing in otology and Mr W H. H. Jessop representing those specializing in ophthalmology who will undertake the organization of these special branches for clinical demonstrations during the Congress.

Headquarters for the Congress will be at the Cecil and Savoy hotels, the main headquarters being at the former hotel, where will be located the registration room, the bulletin room for the clinics in General Surgery in the Victoria room, and the Grand Hall for the evening sessions in General Surgery these rooms occupying the whole of the ground floor and opening off the Embankment. The bulletin room for clinics in Eye Ear Nose, Throat and Mouth Surgery and the place for holding the evening sessions for the same section will be the Ballroom of the Savoy

The general manager of the Congress, Mr Ballou is making a careful survey of the clinical

theatres in the London hospital It is intended that previous to the meeting a careful estimat of the accommodations for visitors shall have been made and a system of special ticket will be provided, whereby all members of th Congres will be assured of being able to witness the opera tions in the several hospitals without crowding thus relieving the visiting surgeons of any un certainty with regard to the accommodations Even at this dat It is quite apparent that the capacity of the numerous operating room I sufficient to provide for a very large number of visiting surgeons.

The Royal Society of Medicine ha generously placed at our disposal a large room in its new building at 1 Wimpole Street W for use a temporary executive offices

In addition to the Cecil and Savoy there a large number of hotels centrally located which have agreed to make ad vance reservations for members of the Congress These hotels in clude among others, the Carlton, Metropole Grand, Victoria, Grosvenor Imperial, Russell, Waldorf Ritz, Piccadilly Great Central. While there will be no difficulty in securing hotel ac commodations somewhere in London during the week of the Congress, I should advise that members mak their reservations very early especially those who wish to reside in one of the headquarters hotels

THE LONDON COMMITTEE

This committee is composed of a representath from each of the hospitals that have co-operated in extending an invitation to the Congress Its members are a follows

THE LONDON COMMITTEE

Honorary Chairman SIR ALFRED J COOLEY

Honorary Secretaries MR HERBERT J PATTERSON MR HERBERT S PENDLEBURY

St Bartholomew MR McADAM ECCLES
St Thomas MR CECIL WALLIS
Westminster MR WALTER SPRY
Guy — MR C H FAGGE
St George MR H S PLENDERLEITH
London MR J SHAW
Middlesex MR T H KELLOCK
University — MR R JOHNSON
St Mary's MR W H CLAYTON GREEN
King College MR I H REDFERN
Charing Cross MR H S CLARKE
Royal Free MR JAMES BERRY
Metropolitan MR MAYNARD HEATH
Cancer MR C RYALL
Hospital for Sick Children — MR C F WARD
West London — MR TYRRELL GRAY
National MR PERCY SARGENT
St Peter's — MR J THOMSON WALKER
Prince of Wales — MR H W CARSON
Homeopathic — MR J JACKSON CLARKE
St Marks — MR P LOCKHART MUMMERY
New Hospital for Women — MISS AUGUSTA BERRY

SURGEONS OF LONDON HOSPITALS WHO ARE MEMBERS OF THE CIRCLE FOR CONGRESS

St. Bartholomew Hospital

Surgeons Sir A. A. Bowlby Mr. D Arcy Power Mr H. J Waring, Mr McAdam Eccles, Mr R C Bailey Mr L. B Rawling, Mr G. E. Gask, Mr. C. C Watson, Mr H Wilson, Mr G Ball

Gynecologists Dr W S A. Griffith, Dr H. Williamson.

Ophthalmic Surgeons M W H Jessop, M W Holmes Spicer

Throat Surgeons M W D Harmer M F A Rose

Ear Surgeons Mr C E West M Sydney Scott.

St Thomas's Hospital

Surgeons Mr G H Makins, M W H Battle Mr. C. A. Ballance M H B Robinson Mr C Wallace, Mr E M Corner M P W G Sargent, Mr C. A. R Nitch

Obstetricians Dr W H H Tate D J S Fairbairn.

Ophthalmic Surgeons M J B Lawford M J H. Fisher

Throat Surgeon M W G Howarth

Ear Surgeon M H J Marriage

Westminster Hospital

Surgeons M C Stonham M W G Spencer M A. H. Tubby, Mr W Turner Mr A H Evans, M P Rock Carling, M J M G Swanson

Obstetricians Dr G D Robinson Dr S Dodd

Ophthalmic Surgeon Mr G Hartridge

Throat Surgeon M P R W de Santi

Guy Hospital

Surgeons Sir W A Lane Mr L A Dunn Sir Alfred Tripp Mr F J Steward M R P R Wanklyn, Mr P Turner Mr L C Hughes M R Davies Colley M C H Fagge

Obstetricians D G B Smith, Mr C H Chapple

Ophthalmic Surgeons M H L Eason M A W Ormond

Throat & Ear Surgeons M W M Mollison, M T B Layton

St George Hospital

Surgeons M G R Turner M F Jaffrey Mr H S Pendlebury Mr F C English, M W F Fedden, M I or Back M C. H Frankau

Gynecologists Dr A F Stabb, Dr G Darwall Smith

Ophthalmic Surgeons M H. B Grimsdale M R R James

Aural Surgeon M W C Bull.

Throat Surgeon M H S Barwell

London Hospital

Surgeons Sir F Eve Mr J Hutchinson, Mr T H Openshaw M P Furnivall, M H. M Rigby M J Sherren, M H Lett, Mr Russell Howard M R Warren Mr F S. Kidd, Mr R. Milne, Mr A J Walton

Obstetrician Dr H Russell Andrews.

Ophthalmic Surgeons M A. B Rothergh M W T Lister

Throat Surgeon Dr H. L Lack.

Aural Surgeon M Hunter F Tod

Middlesex Hospital

Surgeons Sir A. P Gould, Sir J Bland Sutton, Mr J Murray Mr T H. Kellock, Mr W S Handley Mr G Taylor Mr A. E. Johnson.

Gynecologists Dr Comyns Berkeley Dr Victor Bonney

Ophthalmic Surgeons. Mr W Lang Mr A Lawson

Aural Surgeon M S Hastings.

University Hospital

Surgeons Sir R. J Godlee, M A E. J Barker Mr B Pollard Mr Raymond Johnson Mr W B L Trotter Mr H. M Davies

Obstetricians Dr H R. Spencer Dr C F Blacker

Ophthalmic Surgeons Mr P Flemming Mr J H Parsons

Throat & Ear Surgeon: M H. Tilley

King's College Hospital

Surgeons Sir W W Cheyne, Mr A. Carless, M F F Burghard, M G L Cheatle, M T P Legge, M A Edmunds.

Gynecologists Dr J Phillips, D H Playfair

Ophthalmic Surgeons M L A Cargill M H W Lyle

Throat Surgeon Sir St Clair Thomson

Ear Surgeon Mr A H. Cheatle.

St Mary's Hospital

Surgeons. Mr J E Lane M A W Low M W H Clayton Greene, Mr S M ward Smith M Duncan Fitz Williams Mr A Z Cope

Obstetrician Dr W J Gow

Ophthalmic Surgeon Mr L. J Paton

Throat & Ear Surgeon D W Hill

Charing Cross Hospital

Surgeons M Stanley Boyd, Mr H F Waterhouse, Mr Chas. Gibbs, M H S Clogg M P L. Daniel, M W T Fenwick.

Obstetrician D T W Eden.
Ophthalmic Surgeon: M L T Williams
Throat & Ear Surgeons M F B Waggett, Mr E. D Davis

Royal Free Hospital

Surgeons M J Berry Mr W H Evans, M T P Legg, Mr J Cunni g M G Pannett.
Gynecologists Mrs. Vaugh hawyer Mrs Willey
Ophthalmic Surgeon Mr M L. Hepburn
Throat & Ear Surgeon M J O French

Metropolis Hospital

Surgeons Mr. Peter Daniel, Mr W Ashdowne Mr H. Curtis, M Maynard Heath, M R. C Lmslie
Gynecologist: Dr H J Playfair
Ophthalmic Surgeon M L J Priest.

Cancer Hospital

Surgeons M C. Ryall, Mr. W E. Miles, Mr R. H Jocelyn Swan, M J Canning, Mr J H I ans M Cecil Rowntree, Mr H. W Wilson

Hospital for Sick Children

Surgeons Mr T H Kellock, M F M Corner Mr G. E. Waugh, M H A T Fairbank, M O L Addison, Mr H. T Gray Mr L. E Barrington Ward.

West London Hospital

Surgeons Mr A. Baldwin, M D Armour M J C Pardoe M O L Addison, M H T Cray M H S. Soutta
Gynecologist D Drummond Robinson
Ophthalmic Surgeon Mr H. Percy Dunn.
Throat & Ear Surgeon: D H J Davis

National Hospital

Surgeon Sir V Horsley M Donald Armour Mr P Sargent

St Peter's Hospital

Surgeons: Mr S F Edwards, M P J Freyer Mr J G Pardoe M J W Thomson Walker M J S Joly

Prince of Wales Hospital

Surgeons M H W Carson, M E. Gillespie Mr. J Howell Evans.
Gynecologist Dr A F Giles
Throat & Ear Surgeon: Mr H. D Gallie.
Ophthalmic Surgeon: Mr R. P Brooks

Hospital

Surgeons: M J Jackson Clarke, Mr J W Thomson Walker Mr. S. A. Boyd, M Chs Woodward.
Gynecologist: D B Glendenning
Ophthalmic Surgeons Sir W J Collins, M M L. Hepburn
Throat & Ear Surgeon Mr H. Barwell.

St Mark Hospital

Surgeons M F S. Edwards, Mr P Lockhart Mummery M A Baldwin, Mr C. G. Watson M G Anderson, Mr L. E. C Norbury

New Hospital for Women

Surgeons Miss Aldrich Blake, Miss Chadburn, Miss Garrett Anderson, Miss Bolton.
Ophthalmic Surgeon Miss Sheppard

LARGE ATTENDANCE PROMISED FOR THE LONDON CONGRESS

When this was written, some days before going to press, about a thousand men had expressed an intention of making the trip to London to attend the fifth session of the Clinical Congress of Surgeons of North America. The middle of June and the early part of July appear, from the cards so far received, to be the popular sailing dates.

The busy man who wants to leave this country as late as possible, and still arrive in London in time for the Congress, may delay his start from New York until after July 15th

Possibly some can spare time only for the trip over and back. Arrangements are under way that seem to insure a reduced rate on the passage (to Europe) after July 15th, for men who register at the Congress It is a matter of regret that t dat the prospect of reduction in rates to the ives of physicians is not certain If the reduction is extended to include them as well, those who egister for passage beforehand will be given the benefit of the lower rate.

Most of the men who are going to the Congress, are counting on enjoying also at least a month or two of European travel some intend to be gone several months. Many will be accompanied by their wives and families about two-thirds of the replies received, contain this information

EARLY RESERVATIONS ADVISED

It will be of interest to some who have not yet laid their plans, and who may be in doubt as to the exact route they wish to follow to know that Tours A and D as outlined by the Transportation Bureau of the Congress, are eliciting the most interest, and are evidently the ones that will be most widely used. These are both in advance of the Congress. A number of bookings have already been made and as they are continuing to come in right along it will be well, just as soon as your plans are at all definite, for you to let us or Mr J P McCann, Transportation Manager know your needs at once. This will assure you the best accommodations.

The two tours mentioned above are outlined in booklet which will be sent on request either from the office of the secretary of the Clinical Congress, or from that of the transportation manager Mr J P McCann Marbridge Bldg New York City Other tours of interest are also outlined and perhaps no one should settle on either of the above without going over the entire list.

ROUTES OF POPULAR TOURS

Tour A is from New York June 13, and includes stops of several days in Paris, Vienna, and Berlin, where leading clinicians are to entertain the visiting Americans In these three centers there will be some very interesting work to be seen. Shorter stops for clinics will be made also at Munich Leipzig Jena, Frankfurt a M Heidelberg and Amsterdam. Furnishing a welcome relaxation from the study of clinics and giving variety to the tour is a visit of four days in Switzerland, including the ride through Lake Constance and the journey down the Rhine, with stops at some of its important cities. There is much of interest at every point along the way besides the clinics and those who accompany the surgeon will find many enjoyable trips provided to occupy the time

Tour D leaves New York July 2 via the Baltic," for Queenstown and furnishes a most interesting sight-seeing trip through the picturesque countries of Ireland and Scotland. The lakes and mountains of both countries and the most important cities, are included part of the travel by motor part by coach mostly of course, by rail The tour is planned so those taking it will reach London in time for the Congress. This trip may be extended, by those who wish to do so after the Congress, to cover much the same route as Tour A

One large party of special interest already has plans well on foot for a special tour following largely the route of Tour A, with particular attention to clinics. This party composed of southern surgeons is under the auspices of the Georgia Surgeons Club Dr R. M Harbin Secretary Rome Georgia.

BUREAU SERVICE OPEN TO ALL

Those who choose to travel independently will find the Transportation Bureau of the Congress in position to give valuable advice or assistance and to secure reservations or accommodations at hotels in London, as well as transportation that might not be available through regular channels.

There are decided advantages to the tours outlined by the Transportation Department. They will draw together groups with a common interest, making a delightful traveling party party of surgeons will be given consideration by the Continental hospitals that men traveling alone could scarcely hope for One is free for the full enjoyment of his time, because he can pass over to experienced directors the annoying details of travel. With every responsibility in reliable hands, the party may be certain of accommodations, and the travel by parties assures a saving both of money and trouble.

Arrangements are being made and programs prepared for discussions of live surgical topics each day to be held aboard ships on which the larger parties sail.

MEMBERSHIP IN THE CONGRESS

Any physician or surgeon in North America in good standing may become a member of the Clinical Congress by registering at any annual meeting and paying the registration fee. Automatically the subscribers to SURGERY GYNECOLOGY AND OBSTETRICS, the official journal of the Congress, will receive invitations without request. Other members of the profession who desire to attend will receive formal invitations upon request to the General Secretary

REGISTRATION FEE

A registration fee is required of each surgeon upon registration, at which time a membership card will be issued.

Unlike conditions prevailing in most medical societies, where annual dues are paid by each

member without regard to his attendance at any meeting of the society the payment of a registration fee is required of a member of the Congress, only when he is in attendance at an annual session.

The purpose of this fee is to provide funds to meet the expenses of preparing for and conducting the annual meeting, in order that no financial burden may be imposed upon the members of the profession in the city entertaining the Congress. Judging from past experience the amount received from such fees will be barely sufficient for the purpose so that payment of the fee is expected of all who register

MEMBERSHIP CARDS

It will be absolutely necessary for each surgeon who desires to attend the clinics and evening session to register at headquarters and secure a membership card. Admission to all clinics and evening sessions will be strictly limited to members of the Congress upon presentation of such membership cards.

RESERVED TICKETS

Reserved tickets for all clinics and demonstrations, properly numbered and couponed, corresponding to the capacity of each operating room, will be issued to members of the Congress in order of application Provision will be made by which these tickets may be arranged for in advance based of course on the tentative program. In the contingency of the popularity of certain clinics resulting in an unusual demand for tickets thereto the tickets will be distributed in order of application day after day until all applications have been satisfied

EVENING MEETINGS

There will be seven evening meetings furnishing scientific literary programs. On Monday evening there will be the brief formal opening exercises of the Congress, followed by one address on a surgical topic by a distinguished surgeon the program being concluded by the presidential address of Dr John B Murphy On Tuesday evening, there will be two programs, one dealing with general surgical topics, the other with the specialties each with two or more addresses with a discussion of each address by a London surgeon Two similar meetings will be held on Wednesday and Friday evenings.

The Grand Hall of the Cecil will be utilized for evening sessions in General Surgery and the Ballroom of the Savoy for evening sessions devoted to Surgery of the Eye Ear Nose and Throat.

SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME XVIII APRIL, 1914 NUMBER 4

RESECTION OF THE RECTUM FOR CANCER WITH PRESERVATION OF THE SPHINCTER[1]

BY CHARLES H. MAYO, M. D. ROCHESTER, MINNESOTA

THE large bowel is quite commonly affected with cancer, especially the cæcum, ascending colon, sigmoid, and rectum. While it is unfortunate that in the majority of cases of cancer of the large bowel the patients are late in receiving surgical treatment, it is fortunate that such a malignant process may remain for a long time a *local one*. The lymphatics in this structure, except in the lower rectum, are few as compared to those of the small *intestine and other abdominal* organs. *The* inflammatory and cicatricial zone which surrounds such areas of ulceration acts as an effective cofferdam. In fact, such inflammatory deposits often lead to early diagnosis of the true condition, and many cancers of the sigmoid and rectum considered hopeless at the time of a colostomy have within a short period become so much reduced that a radical extirpation has later been possible. Extirpation of the cæcum and ascending colon for cancer has given a high percentage of cures because an anastomosis of the ileum into the colon is an ideal enterostomy for delivering semiliquids. Malignant growths of portions of the large bowel other than the rectum are often extirpated and treated by immediate suture. As to the choice of a method of operation, each case must be considered individually. The Mikulicz method, a two-stage *resection in the movable* colon, is probably more commonly employed now than formerly except in *cancer of the cæcum. This* is one of the safest known methods, although the convalescence following is somewhat more protracted.

Cancers of the rectum in which not more than eight inches of bowel must be removed, the distal section being not nearer than two and one half inches from the anal sphincter, are usually best removed through the Kraske sacral incision, with resection of the coccyx and part of the *lower* sacrum. In such operations the following procedures may be instituted: (1) A freely mobilized bowel projecting *through the anus may at times*, be sutured outside. (2) a large tube may be sutured within the bowel with the terminus just within the anus. (3) a sacral anus may be made and the anal segment sacrificed. (4) a permanent colostomy may be made and the whole rectum removed at the same time or at a later period. A permanent colostomy, however, is quite abhorrent to all patients, and, if it is possible, they much prefer to have the intestinal delivery near its normal location even if uncontrolled and at some additional risk from recurrence of the disease. The efforts to restore *function in cancer* of the rectum and to obtain good cosmetic results in external cancer have added much to the high percentage of recurrence. Permanent colostomy with total extirpation of the

[1] Read before the Southern Surgical and Gynecological Association, Atlanta, December 16, 1913.

rectum gives a higher percentage of cures than methods which restore function.

In patients suffering from cancer of the rectum in the region described we advise a colostomy and through the incision made for this purpose the hand should be inserted and a general examination made of the abdomen as well as the pelvis. If metastasis has occurred precluding cure or if impending obstruction demands it a permanent colostomy is made. If there are no contra indications because of metastases, a temporary colostomy is made with a sufficient spur to deflect all the fecal flow through it.

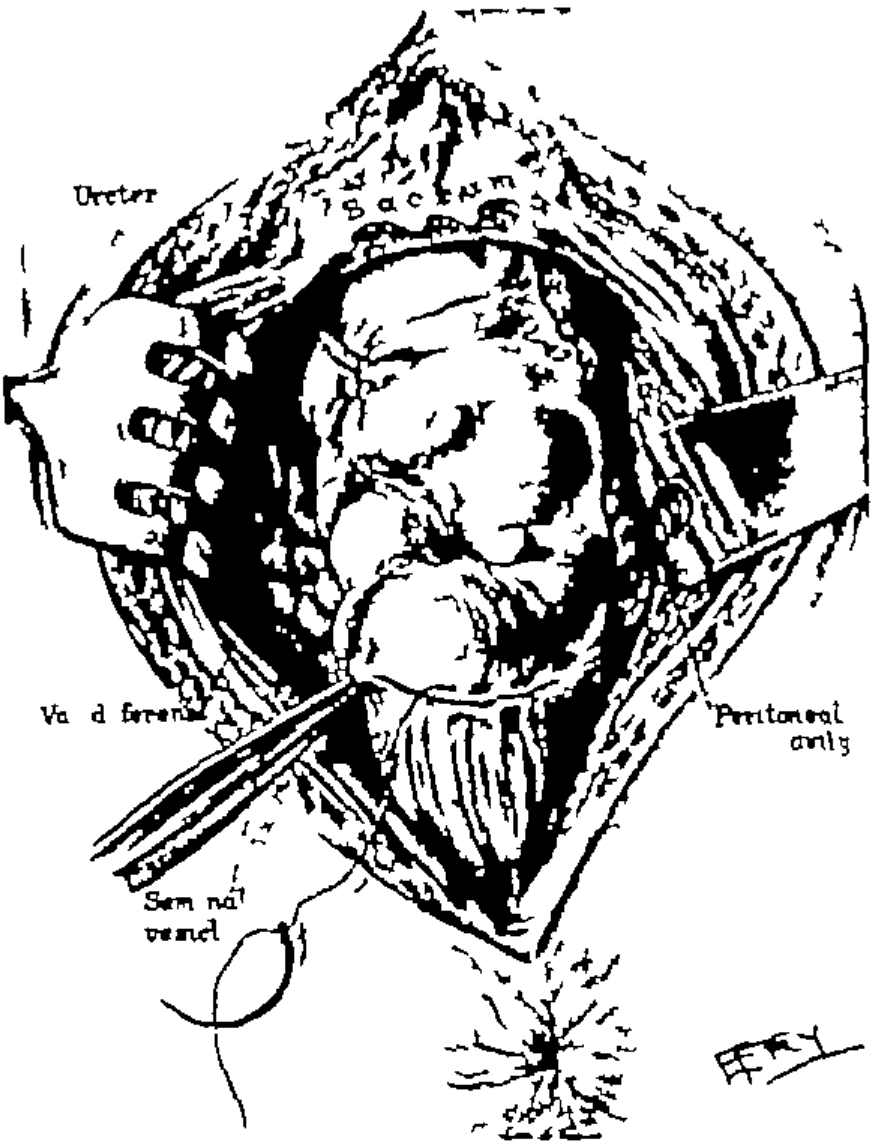
The upper sigmoid should be elevated so that the lower sigmoid need not be shortened so as to prevent the loosening of enough of it to bring together the anterior and posterior sections after the removal of the cancer bearing area. A clear understanding should be had with these patients that if the extent of the disease found at exploration precludes the possibility of resection with good union, and yet if total extirpation of the rectum should come within the limit of advisability with cure a permanent colostomy is to be made with the preservation of all the colon possible. For this we employ a Gursuny twist through the rectus opening of the delivery portion, or the Littlewood type of colostomy through the lateral heavy oblique muscles. Both give exceedingly good control. In either case, at the end of twelve to fourteen days a total extirpation of the rectum is made through the Kraske route.

In the separation of the carcinomatous bowel from the surrounding tissues, great care is exercised to prevent opening it and contaminating the wound. After the pelvic peritoneum is opened the upper rectum and lower sigmoid can easily be drawn down to a great extent and when sufficiently loosened the peritoneal opening is closed by re-attaching its parietal layer to the sigmoid at a higher level with catgut sutures.

Upon completion of the division of the intestine cutting between two pairs of forceps applied above and below the growth, the slightly exposed surface of the bowel is cauterized by the hot iron to sterilize it and effectually scar the surface against grafting thereon any loose cancer cell that may be within the intestine.

While two and one half inches of the terminal rectum is usually the limit of preservation with function of the sphincter four inches is much more convenient in re-suturing the intestine. The lower segment is usually nearly twice the diameter of the upper or sigmoidal portion. About three-quarters of the circumference is surrounded by peritoneum. The smaller upper end of the bowel is now split on the surface anterior to its mesentery, the incision extending up the bowel for one and one-quarter inches, thereby adding two and one-half inches to its circumference. Upon cutting the sharp points from the divided edges the circumference becomes as great at this point as at the distal fragment. Since it is desirable to have the diameter of each end alike for a continuous suture it may be advisable to make two shorter incisions on either side of the bowel. This extra size is demanded because the suture reduces the lumen by nearly one half. While there is no peritoneum covering the lower segment of bowel at the point of suture it is well known that a peritoneal surface is required only on one side for rapid healing.

To avoid fistula in the suture-line, which would usually occur at the free peritoneal or mesenteric side of the upper segment, the bowel is rotated one-half to bring the peritoneal surface posteriorly. This protects the mesenteric border. For the through-and-through suture inverting the mucosa, chromic catgut is used and this is supported by sutures of fine silk which form a second row. At this stage two or three ounces of melted vaseline are poured over and into the cavity of the wound, especially the upper portion, where the parietal peritoneum has been closed. A few sutures bring the structures together loosely over the area of sutured bowel. A rubber tissue drain is inverted on either side of the intestine and brought out of the sacral incision. If the anus is not relaxed it is divulsed. If it shows any contraction upon examination it is well to divide the sphincter muscle anteriorly. This soon heals but permits thorough drainage temporarily from within the intestine. The rather large cavity



which is apparent during the process of the work is quickly filled by intra-abdominal pressure as soon as the position of the patient is changed from the operative one of abdominal recumbency – legs flexed at hips over the table Without fæcal discharge there is very little danger of fistula but should one occur it is usually so tortuous that it closes itself Colostomy incision can be closed as a rule two weeks after resection of bowel

For the treatment of cancer higher up there are several methods of exturpation with or without union, all depending on the extent and conditions in the individual case When situated lower the sphincter must of course be sacrificed

SUMMARY

1 The method permits thorough abdominal exploration

2 A primary or permanent colostomy should be made in most cases of this type.

3 Increasing the lumen of the anterior and, if necessary of the posterior portion of the bowel to double their diameter

4 Rotation of the anterior peritoneal-covered bowel to secure the rapid healing posteriorly

5 Stretching or division of the sphincter to secure drainage of the bowel.

6 Closure of colostomy to secure function

7 If colostomy is permanent, remove rectum at second operation.

CARCINOMA OF THE LOWER LIP ITS DIAGNOSIS AND OPERATIVE TREATMENT

By JOSEPH C. BLOODGOOD M D Baltimore

An investigation of carcinoma arising in any locality of the body should have for its object the determination of whether permanent cures have been accomplished the per cent of these cures and what were the causes of failure to cure So far in this investigation I have determined that the two chief causes of failure to cure are late intervention and no matter what the stage of the intervention incomplete surgery for that stage

In investigating epithelial tumors of the lower lip I have for study about 200 cases, covering a period of about twenty four years (1889-1913) The first question is, Have there been permanent cures after operation for cancer of the lip? This can be answered in the affirmative.

I shall consider first only the fully developed cancer of the lower lip In these cases there is on the lip an ulcer or a fungus The tumor has been removed with or without the gland of the neck, and the microscopic study has revealed a carcinoma of the spino- or endocellular type. We have excluded therefore all benign lesions, all malignant warts (that is lesions histologically malignant) and all rodent ulcers (the so-called basocellular epithelioma or rodent ulcer)

With very few exceptions we have preserved in the Surgical Pathological Laboratory of the Johns Hopkins Hospital the original sections, in many of the cases the original tissue so most of the cases looked upon as cured have been restudied and if the original diagnosis was not confirmed they have not been included in this group. I believe that if the sections of these cases were referred to a number of pathologists there would be no disagreement from the diagnosis of carcinoma

These cases, to repeat, were fully developed lesions of the lower lip — either ulcers or fungi, with the characteristic induration and surface appearance of the formerly so called squamous-cell epithelioma or cancer

These cases are first divided into two groups, primary and recurrent. In the primary group the lip lesion has not been subjected to any definite treatment such as X-rays, radium caustics, excision of a piece for diagnosis cautery or excision of the lesion

Of course in this primary group it is impossible to exclude some form of local irritation after the development of carcinoma. It is impossible to imagine a lesion on the lip which would not be irritated by the motion of the lip biting by the teeth and picking and scratching by the fingers of the host. In some of the primary cases undoubtedly some mild salves or caustics may have been used, but there has been no deliberate attempt at treatment

In the second group the primary lesion on the lip had received some one or more forms of treatment mentioned above there had been local recurrence or recurrence in the glands of the neck only

This is a very important division, because the differences in the results emphatically portray the danger of incomplete and unsuccessful treatment of the primary lesion of the lip

The operations performed upon these primary and recurrent carcinomas of the lower lip have been of two types In the first (our Group 1 a) the operation consisted of an excision of a V-shaped piece of the lower lip including the lesion. In the second group, in addition to this, there was an operation on the glands of the neck, and this latter group is subdivided into cases in which the glands showed no evidence of metastasis under the microscope and those in which there was no doubt as to the involvement of the glands We have designated these groups *1-b glands negative* and *1-b glands positive*.

It is interesting and remarkable that permanent cures have been accomplished in every group but the percentage of cures differs widely and these figures give the key to the situation and, in my opinion, absolutely settle the problem from a surgical standpoint

The longest cured case in each group is as follows

Excision of the lip only (1-a) Pathological No. 2535 living (1913) fourteen years after operation the patient is now seventy-eight years of age. This patient was sixty-four years of age when he first noted a little ulcer on the lower lip, apparently due to the abrasion from a rough tooth. For three years the lesion remained a small ulcer with a scab which the patient occasionally picked, and during this time he had treated the lesion with some salves. It was impossible to estimate how long the carcinoma had been present. The gland operation was not performed. I wish to emphasize this case, because it illustrates that we have no way to estimate when we can accomplish a cure without the removal of the glands. In more recent years this patient would have been subjected to the routine radical excision of the glands of the neck.

This case must be looked upon as a cured cancer of the lower lip in which the operation consisted of the excision of a V-shaped piece of the lower lip including the lesion and a narrow margin of healthy tissue. There was nothing in the gross appearance, the clinical history or microscopic pathology to distinguish this cured case from others in this group who returned later with metastatic glands in the neck, or from cases which we have subjected to the combined local and gland operation, and found that the glands showed metastasis.

Group 1-b glands negative. Here in addition to the excision of the lesion on the lip an operation was performed which had for its object the removal of the submental glands and submaxillary salivary and lymph glands on one or both sides. I will discuss the details of this operation later.

In this group the microscopic study of the glands removed shows no evidence of carcinoma.

The patient who has lived longest since the operation is recorded under Pathological No. 1937. This patient is living (1913) eighteen years since operation. At the time of the operation he was forty-two years of age and had observed a blister on the lower lip about eighteen months. The patient often picked this blister. Up until three months before admission it remained the size of a pea, then it began to grow. When examined it was an ulcer by 1.5 cm. in diameter with the characteristic indurated edge. In this case we may fairly conclude that the beginning of the clinically malignant growth was three and one-half months. Recently I have removed a number of such blisters within a few weeks after onset, and none have been microscopically carcinoma. In the case just mentioned there was no etiological factor such as smoking or chewing tobacco to explain the blister. It is one of the older histories, and in these the details as to the precancerous lesion are meager.

Group 1-b glands metastatic. The patient Pathological No. 2091 is apparently perfectly well (1913) fifteen years after the operation, which consisted of the removal of the lesion on the lip and of all the glands beneath the jaw from parotid to parotid — subparotid, submaxillary and submental. Studied microscopically only the left submaxillary lymph-gland showed metastasis. The epithelioma occupied the left third of the lower lip and the angle of the mouth. The patient at the time of the operation was forty-four years of age. He was a constant pipe smoker and had first observed a wart on the mucocutaneous border of the left lower lip where the pipe rested. The wart was first observed four years ago when it was the size of a split pea, one inch from the angle of the mouth. It grew slowly and finally developed into an ulcer. When he came under observation in the hospital, there was no evidence of the original warty growth, but the portion of the lip mentioned was occupied by an indurated ulcer.

These three cases illustrate the three groups of primary carcinoma of the lower lip.

Considering all cases in which five or more years have elapsed since operation, the probability or per cent of cures in the different groups has been as follows:

Group 1-a, 63 per cent. Group 1-b glands negative, 95 per cent. Group 1-b glands metastatic, 50 per cent.

In Group 1-a there are seven positive cures: three patients returned with metastatic glands in the neck; two of these were subjected to operation, but were not cured. In one instance the recurrence was local on the lip. These local recurrences will be discussed later.

Therefore, in ten cases of cancer of the lower lip subjected to a local operation only three cases, or 30 per cent, returned later with metastatic glands in the neck.

In *Group 1-b glands negative* there are 21 cases. Twenty patients or 95 per cent, are well five years or more since operation. The one failure was due to local recurrence in the lip.

These clinical results, in 21 cases in which our microscopic examination failed to find cancer metastasis, may be looked upon as

confirming the pathological diagnosis. This becomes obvious only when we consider the results in the next group.

Group 1-b glands metastatic. Six cases are well five or more years since operation (50 per cent). In two there was a recurrence in the neck but these patients were cured by secondary operations. In four cases the regional recurrence was hopeless two of these had local recurrence also.

These figures show that with the operation as performed only fifty per cent of the cases have remained free from recurrence in the neck when the glands removed at the first operation showed metastasis.

The accuracy of our figures and the clinical confirmation of our diagnosis as to the presence or absence of metastases in the glands removed in Group 1 b is shown in the following which are probably more than mere coincidence. The percentage of cures in Group 1 a local operation only is 63 that is, in 37 per cent the failure to cure was due to the presence of glandular metastasis at the time of the operation. Now when we put together Group 1 b glands negative 21 cases, and Group 1 b glands metastatic 12 cases we find that the probability of metastasis at the time of operation is 37 per cent which leaves 63 per cent with glands negative and equals the per cent of cures in the cases in which the glands were not removed. We however do not need this rather interesting coincidence of figures to indicate the necessity of the glandular operation. At least in the five year cases the per cent of glandular involvement either estimated by the microscopic examination of the glands removed in Groups 1 b or the recurrences in the glands in Group 1 a is 37 per cent. Every patient therefore with a fully developed carcinoma of the lower lip of the spino or cuboidcellular type runs the risk of metastasis. I have been unable from a most critical investigation to find any evidence from the clinical appearance or the microscopic examination of the lesion on the lip which would allow one to conclude whether the probability of metastasis is more or less. There is therefore every reason for routine removal of glands of the neck in carcinoma of the lip.

This it seems to me may be looked upon as a settled question. If the glands are involved the probability of a cure from our present statistics is fifty per cent. I think I shall be able to show later that this can be increased by improvements in the neck operation.

However this possibility and thirty five per cent probability of metastasis to the lymph-glands of the neck after the cancer had ingrafted itself on the precancerous lesion and the fact that when this metastasis had taken place the probability of a permanent cure is fifty per cent, justify the conclusion that the best time to excise the lip lesion is during the precancerous stage.

Judging from a tabulation of the duration of the disease from the onset of the first visible and palpable lesion to the time of operation and the duration of certain changes in this lesion which indicated at least the development of clinical carcinoma we may conclude with a large degree of certainty that the removal of the lesion in the early weeks after its onset would accomplish a cure in almost one hundred per cent of the cases.

It is also my opinion that there will not be many unnecessary operations. Any lesion of the lower lip which does not heal within a few weeks should be excised. This can be done under local anesthesia the scar is insignificant even to a woman.

Benign Precancerous Lesions of the Lower Lip

Up to the present time (December 1913) among about 200 lesions of the lower lip 15 (about 7 per cent) have been microscopically benign. It is my opinion that these lesions represent in gross and microscopic characteristics the lesions that the remaining 185 patients told us about as *the beginning of* their trouble on the lower lip. But in the 185 patients certain changes had taken place which the patients themselves had observed and which we found when we studied the lesion in the gross and microscopically. Carcinoma or malignant epithelioma was present microscopically in every instance. In 18 cases the gross lesion was still what might be called a wart but microscopically carcinoma was



Fig Pathological N 2746 Precancerous lesion of lower lip blister from smoking
White male aged 33 first blister nine months, healing after ceasing smoking recurrence six months fter resuming, but did not heal han patient discontinued smoking again Complete excision
Serial sections show no carcinoma in excised area, but superficial ulceration with some atypical downgrowth



Fig 2. Pathological N 4949 Photograph of excised piece from lower lip The dark area is "smokers' burn
White male aged 60 lesion one year Complete local excision, November 9 1
Microscopic section Fig 5

evident. I have called this lesion a *malignant wart* In the remaining 167 cases the gross lesion was either an ulcer or a fungus and microscopically a fully developed carcinoma, with few exceptions of the spinal-cell type I will discuss later the few cases of *carcinoma basocellulare* or rodent ulcer

It is interesting to note that nine of the benign lesions have come under observation in the last five years, while during the previous nineteen years there were observed only six benign lesions This large increase in the number of the benign precancerous lesions of the lower lip is entirely due to the education of our medical students and to the members of the profession and public who have been reached by the local educational propaganda

Duration The duration of these benign lesions is of great importance, because it explains why we have accomplished cures in cancer of the lower lip in persons who have come for treatment many months or years after the beginning of the first visible and palpable change in a small spot at the mucocutaneous border of the lower lip In these cases it is often impossible to estimate when cancer develops One can be certain of two facts only the duration of the disease and the presence of carcinoma Now that I have had the opportunity to study critically fifteen benign lesions I can understand why some cures have been accomplished in cancer of the lower lip when the lesion has been present a considerable time.

In twelve of these fifteen benign lesions we have exact data as to their duration two were present less than one month one two months two six to nine months one, nine months to one year one, eighteen months two two years two three years two five years

Up to the present time I have never observed a lesion still microscopically benign with a duration of definite existence over five years. However in some of the patients who have come under observation with cancer the history would suggest that the benign lesion in a few instances had been present and quiescent for more than five years but, of course, one cannot prove this.

Smokers burn The most frequent benign precancerous lesion is a burn from smoking a pipe or cigar At the mucocutaneous border of the lower lip (Fig 1) there appears a small depressed area dark in color and of leathery consistency This dark area (Fig 2) cannot be picked off as a scab Microscopically it is composed of dried, hornified epithelium beneath which there is a zone of epidermis in which the papillary body is practically absent nor do we see sweat glands or hair follicles In Figs 3 and 4 we have the microscopic appearance of a burn of but four weeks' duration



Fig 3. Pathological No 4 6. Precancerous lesion smokers burn. White male aged 43; lesion four weeks. The section shows the mucous membrane at the edge of the burn and the new epithelium growing over the ulcer. See Fig. 6 for high power and Fig. and 2 for the gross appearance of smokers burn



Fig 4 Pathological No. 4 6. High power of section shown in Fig 3 New epithelium growing over superficial ulcer due to burn.

In Fig 5 of a similar lesion of one year's duration (for gross appearance see Fig 2) we note complete epidermization, while in Figs. 3 and 4, in which the lesion was of but four weeks duration, there are still small areas of ulceration.

From this study I am impressed that in a smokers burn of this kind the epidermis of the mucocutaneous border is injured over a small area by a single or repeated application of heat. The probabilities are that the epidermal cells die but do not become detached This sequestrum of epidermis acts like a scab and new epithelium grows across The dry dead surface layer may remain intact as in Figs 2 and 5 for one year

Patients who come to us with cancer tell us that the first change which they observe is that of a scab which can be pulled off The scab stage is of various duration then the patients observe that the scab has become larger induration now appears with the formation of a definite fungus or ulcer Microscopically this latter lesion is always carcinoma

In some instances the excessive smoker experiences a burn with a blister The blister heals and the lesion disappears, or in the position of the blister an ulcer (Fig 6) or a wart appear with, later the development of malignancy

Patients who come under observation with benign smokers burns or with a cancer which has developed in one often give a history of one or more such lesions which have appeared, healed and reappeared usually at the same spot This was the history in the case illustrated in Fig 1

Of the fifteen benign lesions, eight are distinctly smoker burn four are of the type illustrated in Figs 1 and 2 two with the history of the development of a wart in a blister from a burn two of a distinct ulcer (Fig 6) after a smokers burn In seven cases there is no definite history of smoking, but the ulcer or wart developed in a fever blister in two cases and in wounds in five cases

When the mucous membrane or epidermis of the skin is irritated or injured there re



Fig 5 Pathological No 14040 Photomicrograph of smokers' horn of one year duration, in which there has been no change

The section shows layer of epidermis without papillary body formation, resting on chronic inflammatory tissue See Fig for gross appearance



Fig 6 Pathological No 1449 Superficial ulceration of lower lip, associated with diffuse tobacco stomatitis and glossitis, of three weeks duration no induration Wassermann negative

Male aged 72, constant smoker lesions completely healed after stopping smoking and mouth irrigation with bicarbonate of soda If this lesion had not healed it would have been excised

At small subepidermal nodule, excised microscopically benign basal cell epithelioma

sults either an ulcer or a hypertrophy of the epidermis If the epidermis is entirely destroyed, there must first result an ulcer If this remains unhealed we have a chronic ulcer in which there is always an attempt at epidermization or in the healing of the ulcer there may be overproduction of epithelium with the development of a wart, keratosis corn, callosity or papilloma — all terms used to designate different gross types These same lesions may develop at the point of injury without a primary ulceration

So in these fifteen benign lesions of the lower lip there is always an etiological factor of some kind due to either a single or repeated irritation When perfect healing does not take place there remains an epidermal defect of which the patient is conscious although there is no pain

It is impossible to imagine a lesion on the mucocutaneous border of the lower lip which, after it has developed, does not continue to be irritated either by the pipe or the cigar which the patient continues to use or biting with the teeth, picking with the fingers, or even irritation with coarser forms of food.

In this study of 185 cases of cancer we have never observed a microscopically malignant lesion in which the patient has not told us of the first defect which from the description resembled one of the benign lesions which we have seen in the gross and under the microscope

DURATION OF LESION

Among our 200 cases of lesions of the lower lip in only eleven was the defect observed three months or less Three of these cases are benign two very early malignant warts two fully developed cancers both in burns from smoking In these two cases the removed glands showed no metastasis and the patients have remained well five years or more since operation. In one case there was a fully developed cancer in a lesion of three months duration the glands were not removed, and the patient returned in two years and eight months with metastasis to the glands Then there are two recent cases of fully developed cancer of less than three



Fig. 7. Pathological No. 3926. Benign epithelial wart. Male aged 45; lower lip chapped and indented from biting with teeth; wart of three weeks duration. Excision under cocaine. Remainder of lip healed after breaking the habit.



Fig. 8. Pathological No. 3926. Photomicrograph of benign wart. Wart of three weeks' duration, due to biting of chapped lips.

months duration without metastasis to the glands which up to the present time have remained well.

In this group of lesions of less than three months there is one case with metastasis to the glands of the neck. In a period of twenty three years, with a record of 2000 cases, this one case stands out unique in the fact that with a lesion of apparently only three weeks duration the removed glands show metastasis.

Pathological No. 3926. This patient, white male, aged fifty-five has been an inveterate smoker of pipe for years. He claims that his attention was called to the ulcer on the mucous membrane side of the lower lip only three weeks ago by pain. Pain is such an unusual symptom of onset that it is quite probable that the ulcer may have been there longer. The indurated ulcer was the size of a twenty five cent piece began at the mucocutaneous border and involved chiefly the mucous membrane side. This is an unusual position and as a rule the type of the tumor has been of the transitional or cuboidal cell. We have had four such cases, but this is the first one composed of spinal cells with pearly body formation. The operation in December, 1910, consisted of complete *en bloc* dissection of the glands on both sides of the neck, including the tips of both parotid glands, and a large V shaped piece of the lower lip including the ulcer with good margin of healthy tissue. This piece was dissected in continuity with the tissue of the neck. It was necessary to perform slight plastic operation to repair the lip. The cancerous ulcer was entirely on the left side of the lower lip and only the left submaxillary lymph-glands showed metastases. The other glands were negative. This patient is well and free from any signs of recurrence three years since operation (December, 1913).

This investigation of eleven cases of lesions of the lower lip in which the duration was three months or less demonstrates that carcinoma may develop even with metastasis to the glands within this period.

Benign warts. Fig. 7 illustrates a benign wart of three weeks duration. Fig. 8 shows the microscopic appearance. This lesion developed in a lip irritated by habitual biting. The other defects of the lip due to biting are also shown in Fig. 7. After the excision of this wart the patient discontinued the habit and now, December, 1913, nine months since operation the lip is entirely healed.

Fig. 9 illustrates a warty growth which developed in the wound of a razor cut, and this



Fig 9 Pathological No 599 Benign precancerous lesion wart on lower lip Onset in cut from razor three years and three months ago Local excision — no recurrence two and one half years



Fig Pathological No 6458 Photograph of patient with extensive malignant art of lower lip White male aged 6 onset two years, patient carries nails in mouth Chief growth past t months Local recurrence after incomplete operation (See text)

wart has been present three years and three months The picture shows considerable down-growth of the papillary body but at every point the basal cell is preserved and there is no histological evidence of carcinoma This patient is well two and one-half years since operation

Of the fifteen benign precancerous lesions of the lower lip, twelve were treated by excision of a V-shaped piece of the lower lip (Fig 2) and then when the microscopic examination demonstrated no malignancy nothing further was done Among these twelve cases there was one recurrence — the case illustrated in Fig I saw this patient in consultation and advised the excision of the lesion with a good margin Clinically it was benign The patient a doctor writes me that the microscopic examination showed no evidence of carcinoma Apparently sufficient margin was not given to the smoker's burn at least there was a recurrence within a few months The lesion was re-excised The micro-scopic examination of this tissue showed no carcinoma, and there has now been no recurrence six months since the last operation.

I am confident, from my own experience that there should be no recurrence when the lesion is given a good margin, and this larger V-shaped piece will not leave a mutilating scar Fig 2 illustrated the proper margin

In three of the cases a clinical diagnosis of cancer was made and the operation consisted of the removal of the lip and glands of the neck The operations were performed under ether narcosis and one patient died of pneumonia — a white male aged 61 who suffered with chronic emphysema of the lung

I emphasize this death because in lesions of the lower lip especially in older people or younger adults with some handicap the complete operation under ether narcosis has a mortality and as I will discuss later it is never necessary to give a general anæsthetic for the removal of the local lesion on the lip This can be done under local anæsthesia. Then the tissue is examined carefully under



Fig. Pathological No. 4304. Malignant wart of lower lip. Patient aged 43; wart eight months; wound from razor cut. Excision of lesion on lip only. Six months (9 3) well. The scar to the right of the lesion is the result of the excision of another lesion thirteen years ago. This lesion was a malignant wart of eight weeks' duration having originated in a fever blister. At that operation the glands of the neck were removed, but did not show metastases.



Fig. Pathological No. 3836. Photomicrograph of malignant wart of the lower lip.

White male aged 34; wart two months. No note on etiological factor. Excision of lesion and glands of neck. Glands show no metastases. Patient well twelve and one-half years.

After macroscopic study of the wart in this case there was no necessity for gland operation.

the microscope. If this examination shows distinct benignity there is, of course, no indication for the gland operation. If the lesion in the gross is a wart and the microscope shows early carcinoma our experience also demonstrates that there is no necessity for the operation on the glands. When however the section pictures a fully developed carcinoma, the glands should be removed. As I will discuss later this large and carefully investigated material demonstrates that the results are equally good with an operation in two stages, and that, except in the very extensive carcinoma of the lower lip, the removal of the local lesion and of the glands of the neck need not be done in continuity or *en bloc*.

Malignant warts. We have observed eighteen cases. The etiological factors have been the same as in the benign group — burn from smoking, a wound of some kind, fever blister. The result of the injury or the irritation has been the development of a wart which has remained quiescent and has then begun to grow. Clinically these malignant warts have been larger (Fig. 10) than the benign and as a rule there has been ulceration at the surface and at the base. We have never observed a wart larger than the end of the index finger on the lower lip to be microscopically benign but smaller warts (Fig. 1) have been microscopically malignant.

The duration of these warts from the time of the onset of the lesion to treatment has varied from two months to ten years. The shortest duration has been two months — two cases; one case, three to six months; three cases, six to nine months; two cases, nine months to one year; one case; eighteen months, two cases, two years, six cases, five to ten years. In all the cases in which the duration of the wart has been more than two



Fig 3 Pathological No 5994 Photomicrograph of malignant area. The section shows the epithelial nests with pearly-body formations

White male aged 6 papa born seven years, scab formation similar to that shown in Fig 9 until six months ago, then wart developed Operation, November 1909 — excision of lesion on lip and glands of the neck No metastases to glands

The patient is well (9 3) years



Fig 1a Pathological No 14429 Carcinoma of the lower lip Typical surface and indurated edge

Male aged 50, lesion eight months; began as ulcer from carrying nails in mouth (carpenter)

Excision under cocaine Microscopically carcinoma spinocellulare

years the patients have observed recent growth or slight ulceration always of less than six months duration. We have, therefore no observation of a wart becoming malignant in less than two months but we have observed warts that were apparently benign for nine years.

In five cases the operation consisted of excision of a V-shaped piece of the lower lip giving the wart a good margin In this group there have been no recurrences. In the remaining thirteen cases the operation consisted of the removal of the wart and of the glands of the neck at the same operation or in two stages I have never been able to demonstrate metastasis in the glands removed Fortunately there have been no post-operative deaths after this apparently unnecessary glandular operation There has been one recurrence, local, however on the lip and due, I am sure to an incomplete local operation.



Fig 4b Pathological No 14429 Carcinoma spinocellulare See Fig 4 Photomicrograph shows edge of new growth — typical, full developed carcinoma



Fig. 5. Pathological No. 9990. White male aged 51; indurated wound after razor cut of 3 years' duration for 9 years apparently there was nothing but small scab or wart for years he has been treating the lesion with salt, recently with X-ray. The patient states that with every treatment the lesion grew larger. The excavated ulcer followed the application of the X-ray.

Pathological No. 6458 (Fig. 1.) White male aged sixty-two. Onset of the wart two years ago small ulcer due to carrying nails in the mouth (patient is a shoemaker and does not smoke.) The warty growth has gradually increased in size, especially during the last 6 months, and now involves almost the entire lower lip from angle to angle. The gross and microscopic study of the piece removed from the lip above to the margin near the left angle apparently necessitated removal. The glands removed at the operation showed no metastasis. The recurrence in this case was prognosticated from the pathological study. The patient was readmitted two years later with recurrence at the left angle where it had been completely removed, and the recurrence involved the left cheek. An extensive local operation was performed. This patient died in March, 1915, six years after the second operation, with extensive local recurrence.

This case illustrates the danger of delay even in apparently innocent warty growths. It also shows the result of faulty surgery.



Fig. 6. Pathological No. 14393. White male aged 58; smokes hard (pipe) 5 years, healing recurrence 4 years; no local growth until 8 months ago; treatment with caustics 3 months. Now an extensive ulcer destroying the left two-thirds of the lower lip with extensive induration and infiltration of the left cheek and remains of the lower lip down to the jaw.

The photograph shows the result of local operation.

I shall discuss later the modification of the operation to meet the demands of the local growth.

In this group there has not been much difficulty in distinguishing the malignant wart in which apparently it is not necessary to remove the glands. In the gross the lesion on the lip is a distinct wart (Figs. 10 and 11). Microscopically the picture is chiefly that of papillary overgrowth (Figs. 12 and 13) but we always observe at the base of some of the hypertrophied papillæ the absence of the basal cell and the infiltration of the cuboidal and spinal cells into the lymphoid cell stroma.

I should advise any surgeon, if he has any doubt about cases of this kind, to treat them as carcinoma fully developed and to remove the glands. It is my opinion, however, that the pathologically trained surgeon and the surgically trained pathologist should be able to recognize this early malignant group and save the patient the glandular operation, because



Fig 7 Pathological No 2637 Photograph of patient with inoperable cancer of the lower lip and glands of the neck

White male aged 68 Patient plasterer and carries sand in his mouth cancer first three years treatment th caustics and self began 6 months ago uth the result shown in photograph



Fig 8 Pathological No 29 Photomicrograph of carcinoma spinocellulare in small crack in the lower lip Future lesion shown in section See text

this operation, especially under ether narcosis, has an element of danger in the aged and handicapped younger individuals.

CARCINOMA OF THE LOWER LIP

Carcinoma spinocellulare. In the attempt to decrease the number of deaths from cancer there are two factors over which we have control — the duration of the disease and the treatment To decrease the duration of the disease we must educate the public and the profession on the potential dangers of the precancerous lesion To improve treatment, we must educate the profession as to the danger of irritating applications to the precancerous and early cancerous lesion the danger of excision of a piece for diagnosis, and incomplete removal of the local disease From a more critical study of large groups of cases we must educate the surgeon as to the proper operation which varies according to the situation, character and duration of the lesion

Duration of the disease Among 200 lesions of the lower lip in 170 we have accurate data of the exact duration of the lesion on the lip (The remaining cases are those sent to the laboratory from outside sources without exact clinical data and in spite of much correspondence we have been unable to obtain these data)

In only eleven cases (seven per cent) has the duration of the lesion been three months or less I have discussed these cases. Within these three months it is possible for a cancer to develop even with metastasis to the glands.

In an adult over twenty five years of age with a lesion of the lower lip localized at one spot, it will be safer if this lesion does not heal within one month to excise it The danger of delay after one month is metastasis to the glands After the proper radical local excision there should never be local recurrence, even in the fully developed carcinoma But one cannot foretell when

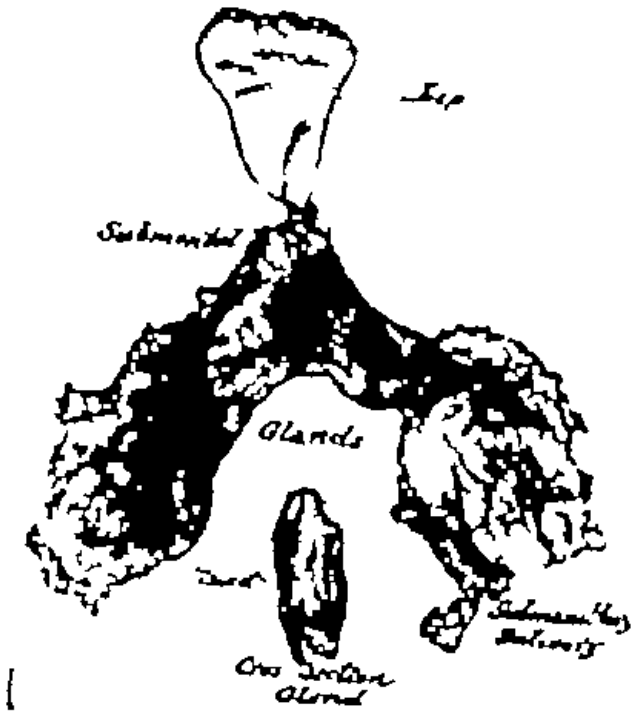


Fig. 9 Pathological No 9284 Photograph of excised piece of lip and mass of tissue removed from the neck, representing the complete en bloc dissection, from parotid to parotid.

White male aged 53 cigar smokers' horn 4 years local growth 6 months, more rapid after cauterization 4 months. The lesion is covered with scab; it has the typical induration of cancer. The glands show no evidence of metastasis. This patient is free from recurrence (December 1913) 5 years since operation



Fig 10 Pathological No 3614 Photomicrograph of metastatic area in submental gland removed 8 years after excision of cancer of the lower lip Well twenty years after first operation

metastasis to the glands does take place My investigation shows that in one lesion of only three weeks duration glandular metastasis had already occurred This, of course is very unusual The danger of metastasis to the glands of the neck is shown by our results in five-year cases twelve cases with but six permanent cures, or 50 per cent. Undoubtedly better surgery will demonstrate that better results may be obtained by a more careful and radical dissection of the tissues in the neck, but I am confident the end-results will never be as good as when the operation is performed before metastasis has taken place This is demonstrated in the investigation of 21 cases in which it is five years or more since the operation This operation consisted of the removal of the lesion on the lip and of the glands of the neck. The microscopic examination of the glands showed no metastasis Twenty (95 per cent) of these cases have been cured. The one failure to cure was due to a local recurrence on the lip. The lesion was an extensive one and in completely removed

We may therefore, safely state that delay after one month means taking gamblers chances, and the probability of metastasis *to glands increases with further delay*

That the public and profession need education in regard to this is shown by the following figures

TABLE OF DURATION OF THE DISEASE IN LESIONS OF THE LOWER LIP

Less than 3 months	
3 to 6 months	8
6 to 9 months	7
9 months to 1 year	
1 year to 18 months	
18 months to 2 years	7
2 to 3 years	9
3 to 5 years	8
5 years and over	3

This table speaks for itself I am quite confident that if the people and the profession understand the situation and the danger of delay the number of earlier cases in future years will be tremendously increased

Among the ten cases in which the lesion was less than three months and in which no

years or more have elapsed since operation there has been but one failure to cure. In this case, already mentioned, the operation consisted of the removal of the lesion of the lip only and this patient returned two years and eight months later with metastasis to glands and was not cured by a secondary operation.

This and many other observations demonstrate that no matter what the duration of the lesion on the lip and no matter how small it is, if the microscopic study shows a fully developed carcinoma of the squamous, or spinal-cell type, the radical operation on the glands of the neck should be performed.

Delay after three months even up to five years or more, by no means indicates a hopeless condition. As has been stated before, the lesion may remain benign, it may only be an early malignant wart, or the development of cancer may be recent, or for some reason, glandular metastasis has not taken place.

In spite of the most critical clinical and pathological investigation, I am unable to elucidate the factor or factors which induce the malignant epithelial growth in the local lesion, or which lead to involvement of the neighboring lymphatics. It does appear however that continuous irritation, either from smoking or picking the lesion, or biting it, or any treatment which does not completely remove or destroy the cells in the local defect, increases the probability of malignant epithelial growth and of metastasis to the glands.

This is shown in the comparison of the results after similar operative treatment of lesions which have received no treatment and of those which have received treatment but in which the treatment has failed to remove the local lesion (see *Table*)

In the fully developed carcinoma of the lower lip excision of the lip only in primary cases has accomplished seven cures out of eleven cases or 63 per cent, one local recurrence and three metastases to glands. Of five recurrent lesions similarly treated there has been but one cure (20 per cent) three local recurrences all with metastasis to glands also and one metastasis to glands without local recurrence

In the group in which the operation consisted of excision of the lesion of the lip and glands of the neck, but in which the glands showed no metastasis, the results in primary cases are twenty cures among twenty-one cases (95 per cent) The one failure to cure was due to local recurrence. Of the five recurrent lesions treated in the same way there are three cures (60 per cent) The failure to cure in two cases was due to local recurrence.

In the next group the operation was identical, but the glands showed metastasis. Among the twelve primary cases there are six cures (50 per cent) of the six cases not cured, in all there was recurrence in the glands of the neck in one case a local recurrence. Among five recurrent cases in this group there is but one cure (20 per cent) In all the four cases not cured there was both local and glandular recurrence.

This table demonstrates that any treatment which does not radically remove the local lesion on the lip decreases tremendously the possibility of a cure, even after the most radical surgical procedure. Among forty four primary cases there are thirty three (75 per cent) cures, with but three local recurrences while among fifteen recurrent cases there are but five cures (33 per cent) and nine local recurrences.

It may be true that some of these bad results both in the primary and recurrent cases are due to faulty surgery but I am confident that the chief factor is the duration of the lesion and previous irritating treatment.

This investigation also shows that incomplete excision with the knife makes the condition much more hopeless than incomplete eradication with strong caustics. The X ray in one case has cured the local lesion, but the patient came under observation later with extensive involvement of the glands of the neck, and in spite of radical removal was not cured. In another case the apparent improvement of the local lesion under X-ray exposure led to a delay of one year and then when the operation took place the glands of the neck were hopelessly involved.

To expose, therefore, a lesion of the lip to X-ray or radium, granting that it may ac